News about

B.F.Goodrich Chemical *raw materials*

HYCAR 1312,

a liquid nitrile polymer for

EASIER PROCESSING

Hycar 1312 improves flow, extrusion and calendering properties in nitrile rubber compounds. As a plasticizer both in nitrile rubber and vinyl plastisols, it is non-extractable, non-migrating and non-volatile.

Hycar 1312 provides nitrile rubber compounds with excellent building and knitting characteristics—it has good tack. Examples of applications where it is finding use are tank linings, building of rolls, and fabrication of hose.

A carboxy modified variation, Hycar 1300x2, possesses similar properties to 1312, but has the added advantage of cross-linking through the carboxyl groups by metallic oxides, epoxy resins, and other similar agents.

For information on either of these Hycar polymers, or other Hycar rubbers and latices, write Dept. CA-3, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

Don't miss the
RUBBER DIVISION MEETING
Los Angeles: May 13, 14 and 15

Hycar
Rubber and Latex

B.F.Goodrich Chemical Company
a division of The B.F.Goodrich Company

B.F.Goodrich

GEON polyvinyl materials • HYCAR rubber and latex
GOOD-RITE chemicals and plasticizers • HARMON colors

PHILBLACK* PRIMER

I is for Inexpensive mileage!

Philblack I adds hundreds of miles to the life of tires, yet it doesn't increase the cost above the moderate price range. It enables you to produce sturdy long-wearing tires and still sell them profitably. Philblack toughens tire treads, increases flex life, helps dissipate heat. It's the intelligent answer to the cost-price squeeze.

If you have a question concerning rubber or carbon black, call your Phillips technical representative for expert advice. You can benefit from Phillips scientific research and practical experience in the rubber field. Make the most of this free technical service.

*A trademark

LET ALL THE PHILBLACKS WORK FOR YOU!

A — **Philblack A, Fast Extrusion Furnace Black.** Excellent tubing, molding, calendering, finish! Mixes easily. Disperses heat. Non-staining.

O — **Philblack O, High Abrasion Furnace Black.** For long, durable life. Good conductivity. Excellent flex life and hot tensile. Easy processing.

I — **Philblack I, Intermediate Super Abrasion Furnace Black.** Superior abrasion. More tread miles at moderate cost.

E — **Philblack E, Super Abrasion Furnace Black.** Toughest black yet! Extreme resistance to abrasion.

PHILLIPS CHEMICAL COMPANY, Rubber Chemicals Division, 318 Water Street, Akron 8, Ohio • **District Offices:** Chicago, Dallas, Providence and Trenton **West Coast:** Harwick Standard Chemical Company, Los Angeles, California • **Warehouse Stocks** at Akron, Chicago, Trenton, Brighton, Mass. and Toronto, Canada **Export Sales:** 80 Broadway, New York 5, New York • **European Office:** Phillips Chemical Company, Limmatquai 70, Zurich 1, Switzerland.

Rubber Age

COVERING THE MANUFACTURE OF RUBBER AND RUBBERLIKE PLASTICS PRODUCTS

APRIL, 1959 VOL. 85 NO. 1

Published Monthly by
PALMERTON PUBLISHING CO., INC.
Editorial and Advertising Offices
101 West 31 St., New York 1, N. Y.
Phone: PEnnsylvania 6-6872

P. L. PALMERTON, *President*
M. E. LERNER, *Vice-Pres. & Treas.*
E. D. OSBORN, *Secretary*
CHARLES T. JANSEN, *Asst. Treas.*

PUBLICATION STAFF

Editor and General Manager
M. E. LERNER

Managing Editor
B. J. KOTSHER

Technical Editor
FRED D. MOORE

Assistant Editors
BERNARD M. BERNS
STANLEY HOCHMAN
NANCY T. ROCKWELL

News Correspondents
CARL S. HOGLUND
5107 Telegraph Road
Los Angeles 22, Calif.
Phone: Angelus 2-8136

PHIL GLANZER
223 Coldstream Ave.
Toronto 12, Ont., Canada
Phone: Hudson 7-2139

Art Director
KENNETH T. CORELL

Production Manager
BARBARA L. MOORE

Circulation Manager
CONSTANCE SAVAGE

Advertising Sales Manager
CHARLES T. JANSEN

Advertising Representatives
ALLEN M. BROWNE
101 West 31st St.
New York 1, N. Y.
Phone: Pennsylvania 6-6872

F. ROYAL CAREY
68 Shenandoah Road
Warwick, R. I.
Phone: Turner 4-9624

JIM SUMMERS & ASSOC.
35 East Wacker Drive
Chicago 1, Ill.
Phone: Andover 3-1154

CHRIS DUNKLE & ASSOC.
740 South Western Ave.
Los Angeles 5, Calif.
Phone: Dunkirk 7-6149

420 Market St.
San Francisco 11, Calif.
Phone: Sutter 1-8854

In This Issue

77 Liquid Urethane Elastomers—By R. J. Athey

Potential production economies and excellent physical properties forecast an important role for liquid urethane polymers.

82 Effects of Carbon Black on Rubbers for Low Temperature Use—By Fred W. Barlow and Robert W. Cretney

A study of the effect of carbon black type and loading on the temperature-retraction properties of five polymers.

88 Vertical Continuous Vulcanizing—By Ben H. Davis

A new method of applying rubber insulation to wire eliminates damage to the rubber before it is cured.

91 How Many Cavities to Use in a Molding Machine—By William E. Kelvie

A simple formula is a worksaver for the estimator.

93 Division of Rubber Chemistry, A.C.S., Meets in Los Angeles, May 13-15

Abstracts of papers to be presented at the 75th meeting of the Division.

104 Equipment Leasing in the Rubber Industry

How a practice which is becoming increasingly widespread in industry can benefit the rubber manufacturer.

Special Reports

Capitol Cues	51	6	News Highlights
Markets	148	54	Overseas

Regular Departments

As Soule Sees It	61	136	New Equipment
Book Reviews	144	132	New Goods
Chemical Prices	156	130	Obituaries
Classified Ads	170	71	On the Continent
Coming Events	20	28	Patent Review
Editorial	103	124	West Coast News
Financial News	122	*	Statistics
Names in the News	120		

*Appears every other month

Microfilm copies of complete volumes of RUBBER AGE are available from University Microfilms, 313 North First St., Ann Arbor, Mich.
Indexed in Industrial Arts Index and Engineering Index

© Palmerton Publishing Co., Inc., 1959

RUBBER AGE is published monthly by the Palmerton Publishing Co., Inc. Printing Office, East Stroudsburg, Pa. Editorial and Advertising Offices at 101 West 31st Street, New York 1, N. Y. Entered as second class matter Oct. 30, 1933, at the Post Office at East Stroudsburg, Pa., under the Act of March 3, 1879. Subscription in United States, $5.00 a year; Canada, $5.50; Foreign, $6.00; April, 1959. Vol. 85, No. 1.

Highlights Sidelights *of the News . . .*

April, 1959

U. S. Rubber Co. has begun the production of truck tires made from polyisoprene rubber manufactured by Shell Chemical Corp. at a price competitive with natural rubber. As the supply of the new synthetic increases, U. S. Rubber intends to expand production to other kinds of tires . . . The new synthetic is being produced at Shell installations in the Los Angeles area at a rate averaging five tons a day. Capacity is expected to increase to from 15,000 to 20,000 tons annually . . . U. S. Rubber plans to extend the use of the rubber as rapidly as its production will permit (page 106).

A Federal Grand Jury has indicted ten rubber manufacturers and the Rubber Manufacturers Association under the Sherman Anti-Trust Act for conspiring to fix prices of conveyor and power transmitting rubber belting . . . For the past ten years, it charges, the firms have fixed prices and conditions of sales and thereby have deprived buyers of a free and competitive market (page 111).

Three speakers were featured at a technical program at the Spring meeting of the New York Rubber Group . . . Their topics were liquid urethane polymers, isocyanate reactive coatings, and flexible urethane foams (page 112). Other meetings of interest include the Detroit Rubber and Plastics Group (page 108) . . . Quebec Rubber and Plastics Group (page 118) . . . Buffalo Rubber Group (page 119) . . . and the Los Angeles Rubber Group (page 124).

DuPont's long disputed wartime claim against the Soviet Union was settled when Russia agreed to pay DuPont $1,500,000 . . . The claim was an outgrowth of a wartime arrangement under which DuPont provided Russia with technical information on the commercial production of neoprene rubber (page 115).

The Gordon Research Conferences for 1959 have scheduled technical sessions on Polymers and Elastomers . . . Comprehensive programs are planned (page 121).

Paul Weeks Litchfield, honorary chairman for the Goodyear Tire and Rubber Co. and a pioneer in the rubber industry, died on March 18th, a few days after he underwent surgery (page 131).

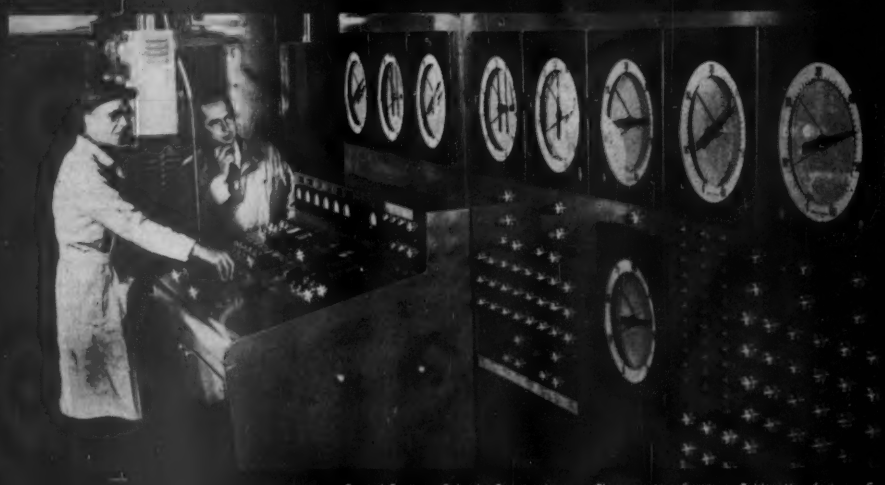
AROMEX ISAF
AROMEX HAF
AROMEX CF
ARROW MPC
WYEX EPC
AROVEL FEF
AROGEN GPF
MODULEX HMF
ESSEX SRF

Wise Owls Read Huber Technical Data.
Ask to be put on our mailing list.

HAVE YOU SEEN HUBER NEWS? We will be pleased to send you a copy of our quarterly magazine.

J. M. HUBER CORPORATION
630 Third Avenue, New York 17, New York
Carbon Blacks • Clays • Rubber Chemicals

START UP . . . moment of truth



Control Center — Calendar Treating Line Photo courtesy Armstrong Rubber Manufacturing Co.

Whether the simplest kind of equipment installation — or the world's first triple-zone rayon/nylon calendar line as shown here — the moment of startup is the culmination of months of calculation and construction . . . an inexorable test of soundness of engineering, skill of manufacture and field erection.

This unique new process line — highly advanced in operation and control — performed at startup, and after a brief two-week testing and minor adjustment period exploring the multiple operating possibilities, went into full-time production at 60 ypm.

Achieving anticipated operating results from the moment of startup is the rule with Litzler fabric treating lines and units. "Our plant engineer reports that the unit has operated very satisfactorily since the time of its installation"* . . . and "Having completed the installation of the subject machine, we want to express our satisfaction at the way it is working and at first results"* . . . are typical judgements of owners.

*Photostatic letter copies on request

C. A. LITZLER CO., INC.

SOUND ENGINEERING FOR TOMORROW'S PRODUCTION

1817 BROOKPARK RD. CLEVELAND 9, OHIO CABLE "CALITZ"

EXPORT REPRESENTATIVE: GILLESPIE & CO. OF N. Y., 96 WALL ST., NEW YORK 5, N. Y.

LICENSED FABRICATORS: Benno Schilde Maschinenbau A. G. Bad Hersfeld, Germany; Soc. Alsacienne de Constructions Mecaniques Paris, France; Mather & Platt, Ltd. Manchester, England

the rubber industry can STOP POLYMERIZATION

with

HYDROXYLAMMONIUM SULFATE

Hydroxylammonium Sulfate—$(NH_2OH)_2 \cdot H_2SO_4$—is an excellent non-discoloring short stopper for use with peroxide-catalyzed polymerizations. It is used in the production of butadiene-acrylonitrile rubber and other polymers.

Physical Properties	HYDROXYLAMMONIUM SULFATE
Formula	$(NH_2OH)_2 \cdot H_2SO_4$
Molecular Weight	164.14
Melting Point, °C	177*
pH of 0.1 M Aqueous Solution at 25°C	3.7
Solubility in 25°C, g/100 g solvent	
In Water	63.9
In 95% Ethanol	0.2
In Methanol	0.1

*Melts with decomposition.

"HS" destroys the peroxide polymerization catalyst as soon as polymerization has progressed to the desired stage. Products of decomposition are oxides of nitrogen which do not remain in the final product. "HS" is adaptable to both hot and cold polymerizations.

Some reports indicate improvement of rubber quality when "HS" is used. It has been found, too, that on a cost-efficiency basis, Hydroxylammonium Sulfate actually is more economical than some commonly used short stoppers.

Write for sample and technical data.

INDUSTRIAL CHEMICALS DEPARTMENT

COMMERCIAL SOLVENTS CORPORATION

260 MADISON AVE., NEW YORK 16, N. Y.

Atlanta • Boston • Chicago • Cincinnati • Cleveland • Detroit • Kansas City
Los Angeles • New Orleans • Newark • New York • St. Louis • San Francisco
IN CANADA: McArthur Chemical Co. (1958) Ltd., Montreal • IN MEXICO: Comsolmex, S. A., Mexico 7, D. F.

Tensile strength is high

Ratio of natural rubber to SBR	Tensile Strength— 125 Part Loading		Tensile Strength— 150 Part Loading	
	Super Multifex	Multifex-MM	Super Multifex	Multifex-MM
50-50	2,400 psi	2,030 psi	2,110 psi	1,890 psi
25-75	2,440 psi	2,200 psi	2,120 psi	2,020 psi
0-100	2,140 psi	2,000 psi	2,000 psi	1,790 psi

Tear strength is high

Ratio of natural rubber to SBR	Tensile Strength— 125 Part Loading		Tensile Strength— 150 Part Loading	
	Super Multifex	Multifex-MM	Super Multifex	Multifex-MM
50-50	270 pit	240 pit	300 pit	225 pit
25-75	225 pit	200 pit	240 pit	200 pit
0-100	200 pit	175 pit	220 pit	200 pit

TENSILE—

up to 2,400 psi

TEAR—

up to 300 pit

with Super-Multifex® and Multifex-MM®

Compare the amazing performance of these Diamond precipitated calcium carbonates with the much lower tensile and tear strengths of compounds containing ground limestone.

See for yourself how Super-Multifex and Multifex-MM improve the physical properties of *your* SBR compounds. And give new high strength to rubber adhesives, too!

For information and technical help on these and other precipitated calcium carbonates, call your Diamond Representative today. Or write Diamond Alkali Company, 300 Union Commerce Building, Cleveland 14, Ohio.

Diamond Chemicals®

something really new and different in styrene/butadiene rubbers

–and it's yours for the ordering

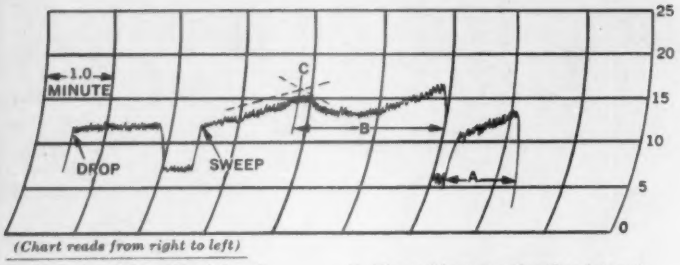
GOODYEAR

CHEMICAL DIVISION

Now–for the first time–you

PROCESSABILITY TEST

Hypothetical Processability Test Chart



(Chart reads from right to left)

A. Polymer breakdown time interval

B. Pigment incorporation time interval

C. Point of complete pigment incorporation

That's right! For the first time–in any rubber –you can be sure of processability–bale after bale, shipment after shipment.

How? Simply by specifying PLIOFLEX for all your styrene rubber needs.

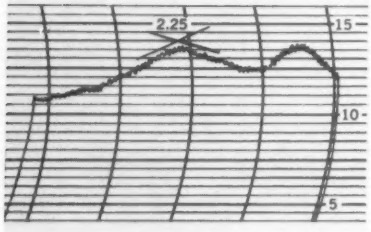
Why? Because Goodyear, through refinement of a previously developed test, has been able to establish a new control over processability.

Here's how it works: A laboratory Banbury is loaded with the polymer to be tested, under a specific set of operating conditions. The polymer is masticated. Then certain pigments are added and the time for their incorporation carefully determined.

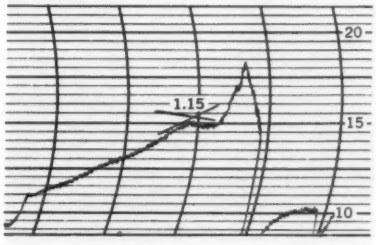
Pigment incorporation is the chart-indicated time, in minutes, from the point where the

And here are the Assured Processability

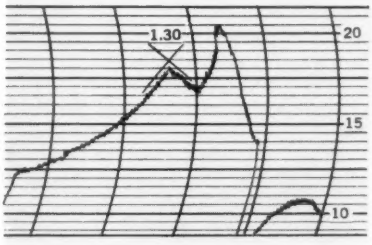
PLIOFLEX 1006 – **APF** = 2.40



PLIOFLEX 1500 – **APF** = 1.25

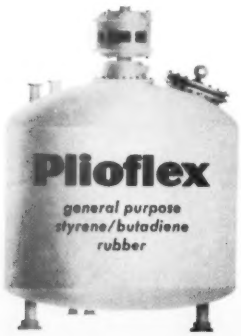


PLIOFLEX 1502 – **APF** = 1.40



NOTE: Shown above are typical Banbury power consumption charts for various PLIOFLEX rubbers. From these charts, maximum pigment incorporation times are determined and Assured Processability Factors established.

PLIOFLEX + Assured Processability =



GOOD

CHEMICAL

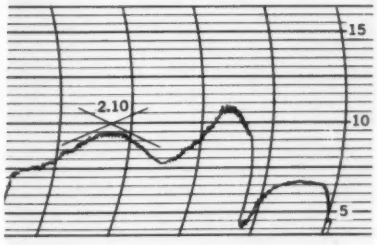
can have Assured Processability!

ram is lowered on the pigment-polymer mix to where there is a peak of power consumption followed by a sharp drop. Pigment incorporation time is an excellent gauge of polymer processability and, in hundreds of tests, has proved to be readily reproducible.

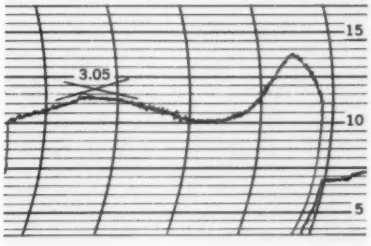
The result? Another industry first—assured processability. Goodyear has set up a production specification, based on maximum pigment incorporation time, which establishes a reproducible control over the processability of every type of PLIOFLEX offered. This means that no matter what type of PLIOFLEX you order, or when you order it, you will know its relative processability and know that it will be consistent. And this is something you could never before be sure of, in any type or brand of rubber.

Factors of typical PLIOFLEX rubbers:

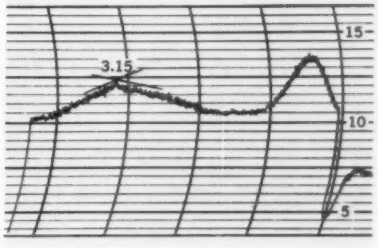
PLIOFLEX 1712 – **APF** = 2.25



PLIOFLEX 1773 – **APF** = 3.15



PLIOFLEX 1778 – **APF** = 3.25



= *Higher-Quality Products @ Lower Cost*

YEAR

DIVISION

IN ADDITION TO ASSURED PROCESSABILITY—

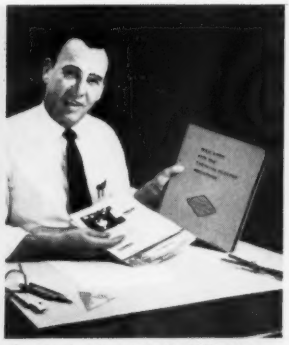
Here are eight more big reasons for specifying

Plioflex:

Outstanding research facilities

Extensive sales-service laboratories

Technically trained representatives



Comprehensive technical literature

The world's largest dry-rubber plant

Exacting quality control

Strategically located warehouses

Prompt, palletized shipments

Plioflex—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

There are other reasons, too—

Once you've tried PLIOFLEX, you'll find a number of other reasons for continuing its use. So why not get the full story today? Just contact your nearest Goodyear Chemical Division Office listed below. Or write Goodyear, Chemical Division, Dept. D-9419, Akron 16, Ohio.

CALIFORNIA, LOS ANGELES
6666 E. Washington Blvd.
Phone: Raymond 3-3611

CALIFORNIA, SAN FRANCISCO
1717 Harrison St.
P. O. Box 648
Phone: Underhill 1-3773

CONNECTICUT, EAST HARTFORD
180 Goodwin St.
Phone: Butler 9-3424

GEORGIA, ATLANTA
2755 Piedmont Rd., N. E.
Phone: Cedar 7-4611

ILLINOIS, CHICAGO
141 West Ohio St.
Phone: Michigan 2-8800

MASSACHUSETTS, BOSTON
66 B St.
Needham Heights
Phone: Hillcrest 4-3900

MICHIGAN, DETROIT
6500 Mt. Elliott Ave.
Phone: Walnut 1-7900

MINNESOTA, MINNEAPOLIS
418 Stinson Blvd.
Phone: Sterling 9-3551

MISSOURI, ST. LOUIS
8544 Page Blvd.
Phone: Harrison 9-4000

NEW YORK, NEW YORK
400 Park Ave.
Phone: Plaza 1-6000

NORTH CAROLINA, CHARLOTTE
929 Jay St.
Phone: Edison 3-1161

OHIO, CLEVELAND
18901 Five Points Rd.
P. O. Box 326
Berea, Ohio
Phone: Clearwater 2-3000

OREGON, PORTLAND
2720 N. W. 35th Ave.
Phone: Capitol 6-2951

PENNSYLVANIA, PHILADELPHIA
2750 N. Broad St.
Phone: Baldwin 8-8500

TEXAS, HOUSTON
5544 Armour Dr.
Phone: Walnut 3-5541

CHEMICAL
GOODYEAR
DIVISION

Here's Your Assurance of Fast Deliveries of

HORSE HEAD® PIGMENTS

TITANIUM DIOXIDES
ZINC OXIDES

Wherever You Are—anywhere from Florida to British Columbia, from Quebec to California—you can count on maximum delivery service on l.c.l. shipments of HORSE HEAD pigments:

1. Fast deliveries
2. Storage reserve in depth
3. Your choice from the most complete line of white pigments—titanium dioxides and zinc oxides

THE NEW JERSEY ZINC COMPANY
Founded 1848
160 Front Street, New York 38, N. Y.
BOSTON CHICAGO CLEVELAND OAKLAND LOS ANGELES

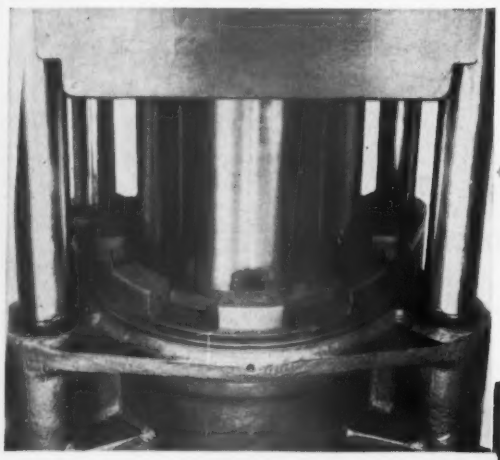
Also Distributed by
VAN WATERS AND ROGERS
SEATTLE PORTLAND (ORE.) SPOKANE VANCOUVER, B. C. DALLAS HOUSTON
ST. LAWRENCE CHEMICAL COMPANY, LTD.
TORONTO, ONT. MONTREAL, QUE.

HORSE HEAD PRODUCTS ®

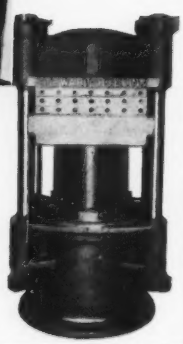
NEW

Exclusive Development by STEWART BOLLING
Slashes Press Packer Replacement Time
and
Eliminates Other Maintenance Hazards-

STEWART BOLLING BREECH BLOCK DESIGN



Close-up of Stewart Bolling breech block design holding press packer and gland ring.



FEATURES

- NO STUDS AND NUTS IN GLAND RINGS
- NO SCORING OF RAM
- NO PACKER DAMAGE
- SELF-LEVELING

Minutes, not hours! Pennies, not dollars! That's what still another exclusive development of Stewart Bolling's 30-year background has done to press maintenance. This new and latest feature, the Bolling breech block design (patented), eliminates studs and nuts in press gland rings. Self-leveling, it prevents ram scoring, stud breakage and packer damage. Packer replacement takes minutes. This new design can be had on 1959 Stewart Bolling presses.

Stewart Bolling
& Company, Inc.

3190 EAST 65th STREET • CLEVELAND 27, OHIO

Designers and Builders of Machinery for the Rubber and Plastics Industries

Intensive Mixers • Calenders • Mills • Refiners • Crackers • Dust Grinders • Sheeters
Hydraulic Presses • Pump Units • Accumulators • Elevators • Bale Splitters • Vulcanizers
Speed Reducers • Gears • Extruders

News in Brief

► Whittaker, Clark & Daniels, Inc., has relocated the company's New York office to 100 Church Street.

► A folder listing the various industrial and educational motion picture films available has been issued by the Chemicals and Plastics Division of Eastman Chemical Products, Inc., a subsidiary of Eastman Kodak Co.

► M. Michel and Co., Inc., has published a new data sheet on Cachalot brand fatty alcohols which lists selected grades from a full line of C12 to C18 straight chain aliphatic alcohols.

► Naugatuck Chemical Division of U.S. Rubber Co. has released its Paracril Bulletin No. 229 in which its latest oil-resistant synthetic rubber, "Paracril ALT" is discussed.

► Diamond Alkali Co. has been presented with the "Bronze Oscar of Industry," award by *Financial World,* in recognition of its 1957 Annual Report.

► The Chemical Division of Goodyear Tire & Rubber Co., has released its latest Tech Book Facts on "Wing-Stay 100" Discoloring-Type Stabilizer-Antioxidant-Antiozonant.

► A new 16-page illustrated bulletin which points out how pneumatic conveying systems can reduce plant operating costs and improve plant efficiency has been issued by the Day Co.

► J. M. Huber Corp. has issued a bulletin reporting on five of its water fractionated clays for use by the rubber industry.

► The Buffalo district office of Union Carbide Chemicals Co. has been moved to 4446 Main Street, Buffalo, N.Y.

► A comprehensive 24-page brochure on dimethyl ethers has been made available by Ansul Chemical Co.

► A new 12-page illustrated manual, "How to Get Longer Life from V-Belt Drives" has been issued by B. F. Goodrich Industrial Products Co.

► The Elastomer Chemicals Department of E. I. du Pont de Nemours & Co., Inc., has released five new reports: "DuPont Chemicals in Butyl Rubber"; "Conac *s*"; "Hypalon Cellular Rubber"; "A New Method for Spraying Neoprene Maintenance Coating"; and "Solubility of DuPont Accelerators and Antioxidants."

► Thiokol Chemical Corp. has issued a bulletin which evaluates the use of butyl rubber in hard rubber compounding as an aid in obtaining improved impact resistance.

Makes RUG BACKING Better Six Ways!

Get all six with Marmix!

1. Less stretch and curl
2. Firmer body and hand
3. Stiffness control
4. Excellent tuft lock
5. Improved age-resistance
6. Lower material cost

In terms of compounding, application and performance, you enjoy realistic rug backing benefits with a MARMIX Resin Latex. MARMIX offers you two distinctive Latices—both offering dependable compounding behavior and important reinforcing advantages. To make your rug backing process easier and more economical, investigate . . .

MARMIX 7345 . . .
HIGH-STYRENE RESIN LATEX

MARMIX 4950 . . .
TERPOLYMER RESIN LATEX

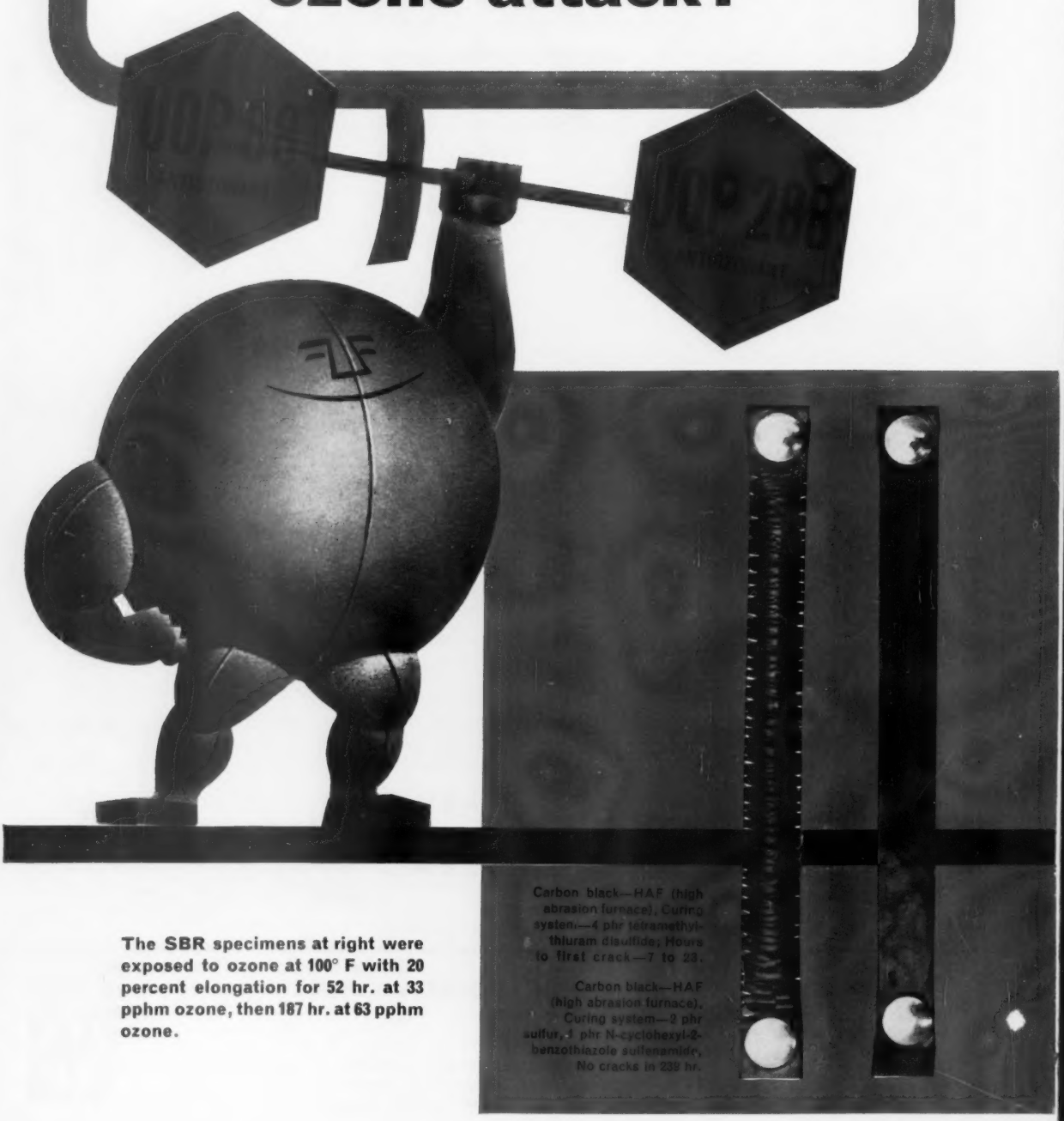
WRITE TODAY FOR MARMIX SAMPLES

PACESETTER IN
Marbon CHEMICAL
SYNTHETIC RESINS

DIVISION of BORG-WARNER
WASHINGTON, W. VA.
also represented by:
WEST COAST: Harwick Standard Chemical Co., Los Angeles, Cal.
CANADA: Dillons Chemical Co. Ltd., Montreal & Toronto
EXPORT: British Anchor Chemical Corp., New York

BW ®
Marbon

how does your CURING SYSTEM help fight ozone attack?



Carbon black—HAF (high abrasion furnace), Curing system—4 phr tetramethyl-thiuram disulfide; Hours to first crack—7 to 23.

Carbon black—HAF (high abrasion furnace), Curing system—2 phr sulfur, 1 phr N-cyclohexyl-2-benzothiazole sulfenamide; No cracks in 239 hr.

The SBR specimens at right were exposed to ozone at 100° F with 20 percent elongation for 52 hr. at 33 pphm ozone, then 187 hr. at 63 pphm ozone.

this key factor, curing, affects antiozonant effectiveness . . .

When you compound rubber with UOP 88 or 288 antiozonants, a versatile chemical barrier continually migrates to the surface, affords sure protection over a long period of time.

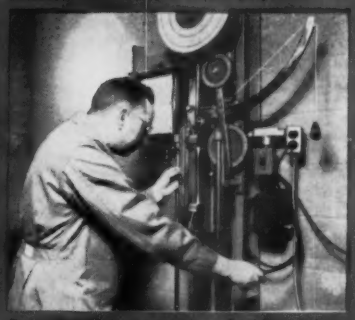
But do you realize that the effectiveness of a chemical antiozonant largely depends on your curing system?

Shown below are two rubber test strips which graphically illustrate this point—show the tremendous difference in ozone resistance brought about by differences in curing systems. The accompanying table confirms this fact—shows how the *proper* accelerator aids antiozonant effectiveness.

UOP facilities and technical personnel are available to help you achieve maximum effectiveness in the use of antiozonants. Just write or telephone our Products Department.

Exaggerated conditions of stress and ozone concentration in the oven assure complete protection under any normal conditions.

In the Universal rubber laboratory, a rubber mill is used to incorporate experimental UOP antiozonants in various rubber polymers.



Every [illegible] test a number of rubber recipes. The Scott Tester is used to measure physical properties of an experimental vulcanizate.

Effect of Curing System on Antiozonant Retention in SBR Stocks after Vulcanization

(All contain 3.0 phr UOP 88; 40.0 phr HAF black)

Compound	Accelerator	Sulfur, phr	% Extractable Antiozonant
1082....	2.0 phr benzothiazyl disulfide	2.0	66.4
1083....	1.0 phr benzothiazyl disulfide	2.0	79.6
1087....	None	2.0	~100.0
1088....	1.0 phr benzothiazyl disulfide	3.0	74.6
1083....	1.0 phr benzothiazyl disulfide	2.0	79.6
1089....	1.0 phr benzothiazyl disulfide	1.0	88.6
1083....	1.0 phr benzothiazyl disulfide	2.0	79.6
1084....	1.0 phr N-cyclohexyl-2-benzothiazole sulfenamide	—	—
1093....	1.0 phr diphenylguanidine	2.0	~18.0
1085....	2.0 phr tetramethylthiuram disulfide	—	35.0
1090....	4.0 phr tetramethylthiuram disulfide	—	12.9

UOP

UNIVERSAL OIL PRODUCTS COMPANY

30 Algonquin Road, Des Plaines, Illinois, U.S.A.

COMING EVENTS

April 21. Elastomer & Plastics Group, Northeastern Section, ACS.

April 24. Chicago Rubber Group, Furniture Club, Chicago, Ill.

May 1. Joint International Meeting, Buffalo Rubber Group-Ontario Rubber Section, CIC, Hotel Sheraton-Brock, Niagara Falls, Ont.

May 1. Philadelphia Rubber Group, Poor Richard Club, Philadelphia, Penna.

May 3-7. Electrochemical Society, 115th National Meeting, Sheraton Hotel, Philadelphia, Penna.

May 4. Washington Rubber Group, Technical Meeting.

May 7. Northern California Rubber Group.

May 10-13. American Institute of Chemical Engineers, Kansas City, Mo.

May 12-15. Division of Rubber Chemistry, ACS, Spring Meeting, Biltmore Hotel, Los Angeles, Calif.

May 14. Los Angeles Rubber Group, meeting in conjunction with ACS, Beverly Hilton Hotel, Beverly Hills, Calif.

May. 19. Elastomer & Plastics Group, Northeastern Section, ACS.

May 22. Connecticut Rubber Group.

May 25-27. Chemical Institute of Canada, 42nd Annual Conference, Halifax, Nova Scotia.

May 25-28. ASME Design Engineering Conference, Convention Hall, Philadelphia, Penna.

May 26-29. Societe de Chimie Physique, 9th Annual Meeting, Paris, France.

June 4. New York Rubber Group, Summer Outing.

June 5. Fort Wayne Rubber & Plastics Group, Summer Outing.

June 5. Quebec Rubber & Plastics Group, Golf Tournament.

June 6. Southern Ohio Rubber Group, Summer Outing.

June 6-7. Southern Rubber Group, Colonial Inn, St. Petersburg Beach, Fla.

June 9. Buffalo Rubber Group, Golf Outing, Lancaster Country Club.

June 9-12. Material Handling Institute Exposition, Public Auditorium, Cleveland, Ohio.

June 12-14. Rhode Island Rubber Group, Silver Anniversary Summer Outing, Hotel Belmont, West Harwich, Cape Cod, Mass.

June 14-18. ASME Semi-Annual Meeting, Chase and Park Plaza Hotels, St. Louis, Mo.

June 15-19. American Society of Engineering Education, Annual Meeting, Pittsburgh, Penna.

June 17-27. International Plastics Exhibition & Convention, Olympia, London, England.

June 19. Akron Rubber Group, Summer Outing, Firestone Country Club, Akron, Ohio.

June 19. Boston Rubber Group, Summer Outing, Andover Country Club, Andover, Mass.

June 21-26. ASTM Annual Meeting, Chalfonte-Haddon Hall Hotel, Atlantic City, N. J.

June 26. Detroit Rubber and Plastics Group, Summer Outing, Western Golf and Country Club, Detroit, Mich.

June 26-28. Los Angeles Rubber Group, Summer Outing, Las Vegas, Nevada.

July 24. Chicago Rubber Group, Golf Outing, St. Andrews Country Club, Chicago, Ill.

Aug. 4. New York Rubber Group, Golf Outing, Forsgate Country Club, Jamesburg, N. J.

Aug. 21. Philadelphia Rubber Group, Summer Outing.

Sept. 12. Connecticut Rubber Group, Summer Outing.

Sept. 13-18. American Chemical Society, 136th National Meeting, Atlantic City, N. J.

Sept. 24. Fort Wayne Rubber & Plastics Group.

Oct. 2. Detroit Rubber and Plastics Group, Fall Meeting, Detroit Leland Hotel, Detroit, Mich.

Oct. 2. Philadelphia Rubber Group, Technical Meeting, Poor Richard Club, Philadelphia, Penna.

Oct. 6. Los Angeles Rubber Group. Meeting sponsored by Plastic and Rubber Products Co., Biltmore Hotel, Los Angeles, Calif.

Oct. 8. Southern Ohio Rubber Group, Fall Technical Meeting.

Oct. 13. Buffalo Rubber Group, Fall Meeting, Hotel Westbrook, Buffalo, N. Y.

Oct. 16. Boston Rubber Group, Fall Meeting, Somerset Hotel, Boston, Mass.

Oct. 16. New York Rubber Group, Fall Meeting, Henry Hudson Hotel, New York, N. Y.

Oct. 19-21. Ninth Canadian High Polymer Forum, Guild Inn, Toronto, Ont., Canada.

Oct. 20. Elastomer & Plastics Group, Northeastern Section, ACS.

Oct. 23. Akron Rubber Group, Sheraton Hotel, Akron, Ohio.

Oct. 26-31. International Organization for Standardization, Technical Committee 45, Henry Hudson Hotel, New York, N. Y.

Nov. 3. Los Angeles Rubber Group, Biltmore Hotel, Los Angeles, Calif.

Nov. 5. Rhode Island Rubber Group, Fall Meeting, Pawtucket Country Club, Pawtucket, R. I.

Nov. 6. Connecticut Rubber Group, Sports Night.

Nov. 6. Philadelphia Rubber Group, Annual Dance.

Nov. 8-13. Joint International Meeting of Division of Rubber Chemistry, ACS; Committee D-11, ASTM, and Rubber and Plastics Division, ASME, Shoreham Hotel, Washington, D. C.

Nov. 17. Elastomer & Plastics Group, Northeastern Section, ACS.

Dec. 3. Fort Wayne Rubber & Plastics Group.

Dec. 8. Buffalo Rubber Group, Xmas Party.

Dec. 11. Boston Rubber Group, Xmas Party, Somerset Hotel, Boston, Mass.

Dec. 11. Detroit Rubber and Plastics Group, Xmas Party, Hotel Statler, Detroit, Mich.

Dec. 11. Los Angeles Rubber Group, Xmas Party, Beverly Hilton Hotel, Beverly Hills, Calif.

Dec. 12. Southern Ohio Rubber Group, Winter Meeting.

Dec. 18. New York Rubber Group, Xmas Party.

Quality Chemicals for 3 Decades...

From Royce Research—
NEW, IMPROVED ZINC OXIDES

They're here now... new Royce Zinc Oxides that offer you major advantages, including:

- Manufacture under close laboratory supervision that guarantees you *consistent uniformity from lot to lot.*
- Premium-quality performance at the money-saving price of Secondary Zinc Oxide.
- Proved superiority in case after case where equivalent-priced ZnO has failed.
- Powdered coated and pelletized oxides in proven grades to meet *your* specifications.

Get these benefits and savings... consult us about your Zinc Oxide requirements. See your nearest Royce representative, or communicate with us direct.

Manufacturers of Chemicals for Industry

Royce CHEMICAL COMPANY
CARLTON HILL, NEW JERSEY

OUR 30TH ANNIVERSARY YEAR

SALES AGENTS:

H. M. ROYAL, INC.
689 PENNINGTON AVE.
TRENTON, N. J.
EX 6-9176

MOSS-MAYFIELD, INC.
SECOND NAT'L BLDG.
AKRON 8, OHIO
BL 3-9103

CHEMICALS & PIGMENTS CORP.
227 CALIFORNIA ST.
NEWTON 58, MASS.
BI 4-3966

MODERN FOR YEARS TO COME

ANOTHER COMPLETELY NEW, GAS-FIRED RUBBER DRYER by SARGENT

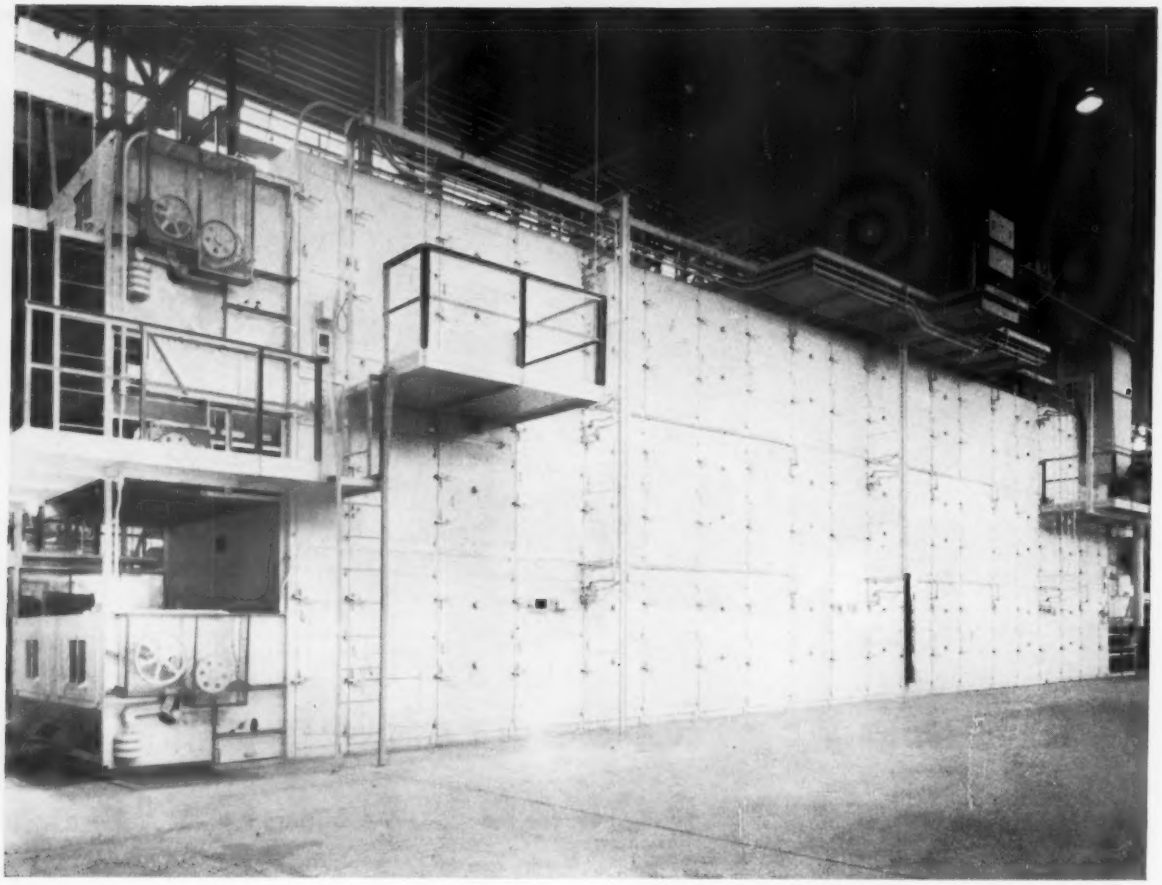


PHOTO COURTESY POLYMER CORPORATION LIMITED, SARNIA, CANADA

POLYMER CORPORATION LIMITED, of Canada, world leaders in development of new applications and new compounding techniques for synthetic rubbers, selected SARGENT to design and build this high volume dryer for their modern new plant at Sarnia. It is believed to be the world's largest gas-fired synthetic rubber dryer . . . and was erected in a record-breaking four weeks.

A direct gas-fired, 3-pass machine, equipped with SARGENT-designed perforated special type stainless steel flight conveyors, it has SARGENT'S exclusive-design breakers, cleaners, and traveling silicone spray devices to provide a perfectly clear conveyor at all times. Dusting and fines are practically eliminated. Downtime for cleanout between runs has been drastically reduced and is kept at a minimum because of SARGENT'S unique housing design. This allows free access to the entire dryer interior through full height hinged doors and quickly and easily removed full height panels which cover the framework.

One of many unusual features of this dryer is that even though the heat source is supplied by only two gas burners, working temperature in the dryer is reached in less than ten minutes from start-up.

Another example of SARGENT modern design and advanced engineering in building dryers to meet varying requirements.

C. G. SARGENT'S SONS CORPORATION

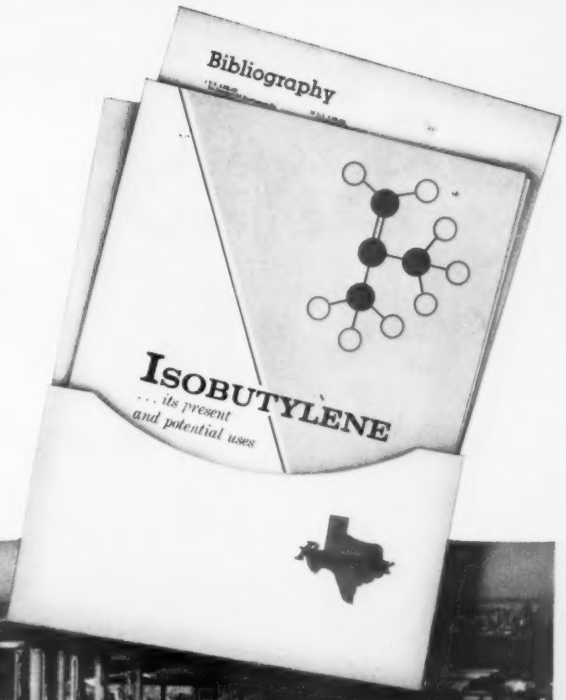
Graniteville, SINCE 1852 Massachusetts

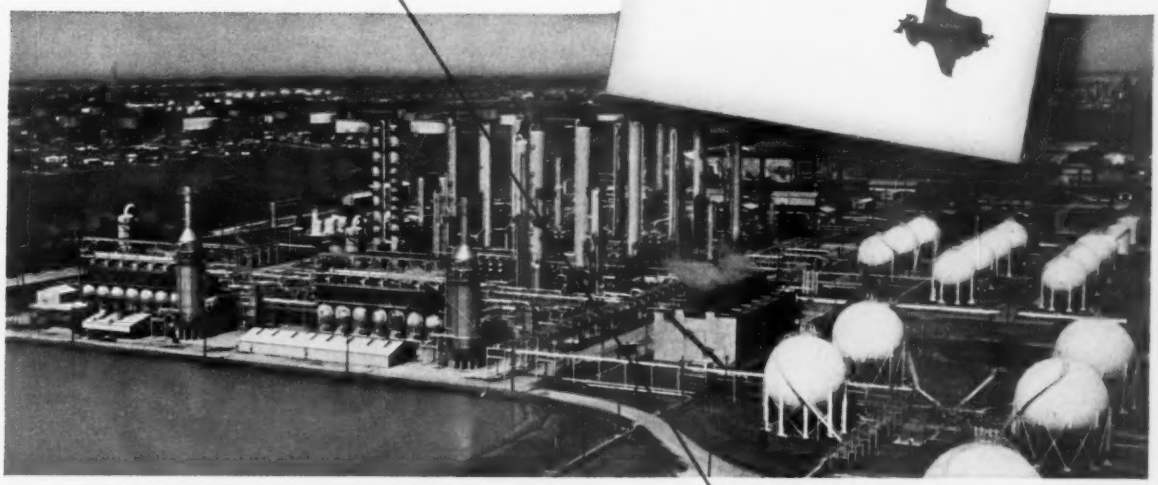
PHILADELPHIA • CINCINNATI • ATLANTA • CHARLOTTE • HOUSTON • CHICAGO • DETROIT • TORONTO

for researchers and new-product developers

first ISOBUTYLENE "Family Tree"

and bibliography of literature references





Two more firsts for Petro-Tex!

First major non-captive production of 99+% Isobutylene and the first comprehensive technical literature package on this relatively-unexploited reactive olefin.

The "family tree" graphically depicts present commercial uses and all reported reactions having potential new-product significance. The bibliography of 213 references should accelerate application research.

We will be pleased to send this new data to those whose work may possibly lead to broader use of Petro-Tex Isobutylene. We also invite inquiries for specifications, price and delivery quotations on

n-BUTENE-1 (95% minimum purity)
n-BUTENE-2 (95% minimum purity)
BUTADIENE
DIISOBUTYLENE
TRIISOBUTYLENE

PETRO-TEX CHEMICAL CORPORATION

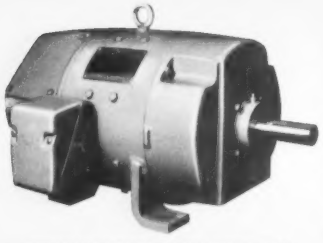
HOUSTON 1, TEXAS

JOINTLY OWNED BY
TENNESSEE GAS TRANSMISSION COMPANY
FOOD MACHINERY AND CHEMICAL CORPORATION

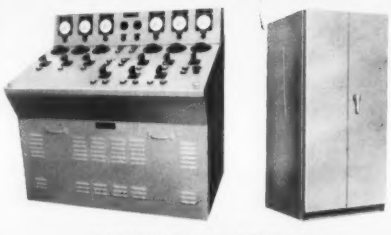
General Electric D-c Drives Help You...

MODERNIZE FOR PROFITS

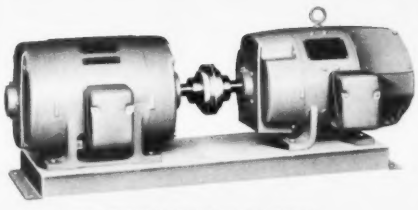
SELECT YOUR DRIVE FROM GENERAL ELECTRIC'S COMPLETE



KINAMATIC DRIVE MOTORS



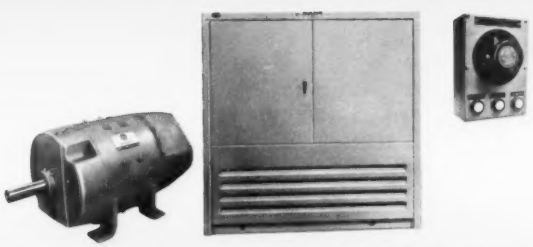
CUSTOM-BUILT CONTROLS



KINAMATIC M-G SETS

You can combat the cost/profit squeeze with a planned program of drive modernization... modernization that provides greater machine flexibility, better quality control, higher output from your calender and extruder. Start your program now. Apply the modern, high performance advantages of General Electric direct-current adjustable-speed drives... drives that provide the fast stops, wide speed range and precision control vital to modern automatic machines. To learn more about the modern capabilities of Kinamatic® motors, Speed Variators and custom-built controls, call your nearby G-E Apparatus Office, or mail the coupon below for a helpful Drive Selection Kit.

LINE OF D-C EQUIPMENT



SPEED VARIATOR PACKAGED DRIVES

To: Section 822-1, General Electric Company, Direct Current Motor and Generator Department, 3001 East Lake Road, Erie, Pennsylvania

Please send me the free General Electric Drive Selection Kit

☐ for extruding ☐ for calendering ☐ also include a free 13 x 29" reproduction of the above painting suitable for framing.

NAME_____

POSITION_____ COMPANY_____

ADDRESS_____

CITY_____ STATE_____

Progress Is Our Most Important Product

GENERAL ELECTRIC

don't be on the outside looking in

This is your last chance to get in

RUBBER RED BOOK

Advertising closing date for the 1959 edition has been extended to May 15. Arrange now for space in the industry's only Directory . . . and most widely used reference book. Send your order in today.

RUBBER RED BOOK Directory. Published annually in June. Advertising closing date, May 15. Page $200; Two-Thirds, $155; One-Half, $110; One-Third, $85; One-Sixth, $50. Phone your space order in . . . today.

published by

PALMERTON PUBLISHING COMPANY, INC.

Publishers of ADHESIVES AGE • RUBBER AGE • RUBBER RED BOOK

101 West 31st Street, New York 1, N. Y.

LIGHT LOADING FOR EXTRA BRIGHTNESS

There's ready wetting and easy dispersion in store for users of UNITANE O-220. High opacity and clear color tone are the result . . . an *economical* result because of the unsurpassed whitening power of this titanium dioxide pigment.

Production people will appreciate the freedom from agglomeration . . . the non-reactivity with rubber chemicals . . . the minimum loading requirements. The *only* effect of UNITANE O-220 in rubber compounding is the production of top-quality whites and pastels.

Full information and samples will be gladly furnished by your Cyanamid Pigments representative.

. . . because

UNITANE® O-220

TITANIUM DIOXIDE

is made to give rubber its ultimate in whiteness

CYANAMID

AMERICAN CYANAMID COMPANY
Pigments Division
30 Rockefeller Plaza
New York 20, N. Y.
Branch Offices and Warehouses in Principal Cities

WHITER AND BRIGHTER WITH UNITANE

NOW

6 REDS
#297
#347
#387
#477
#567
#617

3 TANS
#10
#15
#20

9

MAPICO COLORS FOR RUBBER...

OUTSTANDING ALL THE WAY!

Because . . . these are high-color iron oxide pigments of outstanding purity, providing unusual brightness in mass tone and clarity in tints.

EXCELLENT AGING CHARACTERISTICS WITH BOTH NATURAL AND SYNTHETIC RUBBER

- *Clean, bright color and tint*
- *Easy dispersion and processing*
- *Permanent color*
- *Exceptional strength*
- *Fine particle size*
- *Tear and flex resistance*
- *Controlled pH*
- *Also available: Mapico Yellows, Browns and Black*

You can have full technical assistance—all the information you need—for your particular application. Write today!

MAPICO® IRON OXIDES UNIT
COLUMBIAN CARBON COMPANY
380 Madison Avenue, New York 17, N. Y.

Branch offices and agents in principal cities.

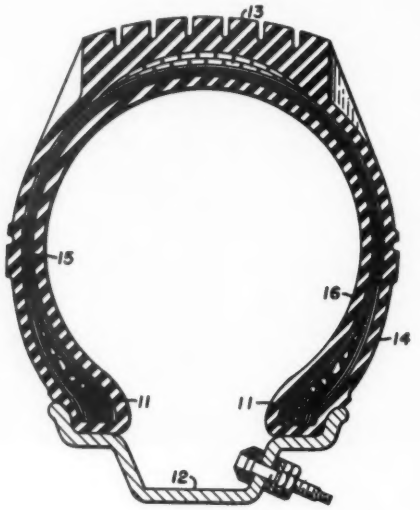
PATENT REVIEW

by Melvin Nord

Vulcanizing Butyl Rubber

U. S. Patent No. 2,857,357, issued October 21, 1958 to Winthrope C. Smith, assigned to Esso Research & Engineering Co., describes a method of accelerating the curing rate of butyl rubber.

In this invention, 100 parts by weight of butyl rubber are compounded with about 8 to 15 parts by weight of a dimethylol phenol. In addition, from about 3 to 10 parts by weight of chlorinated butyl rubber are employed per 100 parts butyl rubber. To the above composition, about 2 to 20 weight per cent of a basic metal, like zinc oxide, magnesium oxide, calcium oxide, lead oxide, or basic metallo-organic compounds such as basic lead stearate, is added. These vulcanizable compositions are then cured at an increased rate of a temperature between about 270 and 350°F. for from about 10 minutes to 5 hours.



Data cited show that butyl rubber compounded for a dimethylol phenol cure can be accelerated in cure rate by a small amount of chlorinated butyl rubber. Furthermore, the tensile strength of the vulcanized butyl rubber cured in the presence of these materials is substantially greater than butyl rubber cured with dimethylol phenol in the absence of chlorinated butyl rubber. This is a very desirable feature because it is now possible not only to increase the cure rate of butyl rubber but, in addition, enhance its strength.

The compositions of the present invention may be employed throughout a tire such as that shown in the diagram. For example, the inner lining (16) may consist of butyl rubber vulcanized in

throughout
the world

MUEHLSTEIN

SYMBOL OF SERVICE, QUALITY AND INTEGRITY.

FOREIGN AGENTS:

- ALEXANDRIA
- AMSTERDAM
- ANTWERP
- BEIRUT
- BUENOS AIRES
- COPENHAGEN
- GÖTEBORG
- HAMBURG
- HAVANA
- HELSINGFORS
- KOBE
- LISBON
- LONDON
- MALMÖ
- MANILA
- MELBOURNE
- MEXICO, D.F.
- MILAN
- OSAKA
- OSLO
- PARIS
- SANTIAGO
- STOCKHOLM
- TANGIER
- TEL-AVIV
- TOKYO

Everything in

RUBBER
and
PLASTICS

Wherever Rubber or Plastics are used there is a ***MUEHLSTEIN*** office or agent nearby to better serve you.

REGIONAL OFFICES:

- AKRON
- BOSTON
- CHICAGO
- LOS ANGELES
- TORONTO
- LONDON

PLANTS AND WAREHOUSES:

- AKRON
- BOSTON
- CHICAGO
- INDIANAPOLIS
- JERSEY CITY
- LOS ANGELES

H. MUEHLSTEIN & CO. INC.

60 EAST 42ND STREET NEW YORK 17, N. Y.

You Can DEPEND On
GENERAL PORCELAIN GLOVE FORMS

GP Year in, year out, the same unvarying quality—smooth, gleaming glove forms free from defects. And not only that, if you will be *sure* of getting an exact duplication of your first order.

Our specially trained, skilled labor turns out the finest forms made anywhere. Only perfect forms pass our rigid inspection.

Send For Brochure

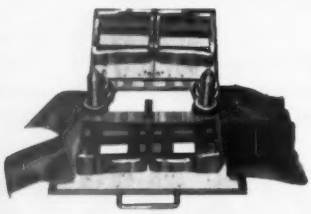
GENERAL PORCELAIN MFG. CO.
TRENTON 8, N. J.

EXPERIENCE... WE HAVE OVER 50 YEARS OF IT...
INDEPENDENT AND NEW ERA

Dies For Every Conceivable Purpose

CLICKER, WALKER PUNCH PRESS and MAUL HANDLE

DISTRIBUTORS FOR:
- Foles Clicker Machines and Seelye Beam Die Presses
- Hard Maple, Rubber, and Fibre Composition Die Blocks
- Rubber Pads
- Die Block Hardener
- Raw Hide Mauls



INDEPENDENT DIE & SUPPLY CO.
2602 LA SALLE PLACE... ST. LOUIS 4, MISSOURI
Associate: NEW ERA DIE CO. Red Lion, York County, Pa.

PATENT REVIEW

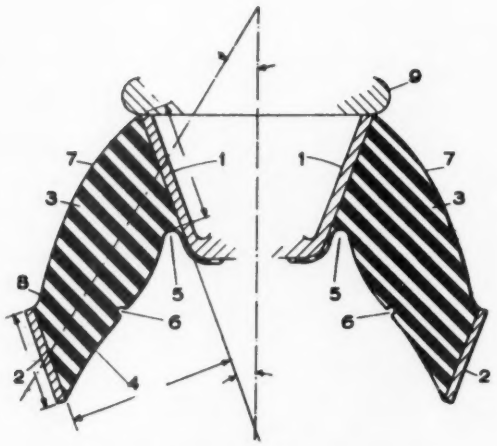
accordance with the present invention. Alternatively, the inner lining may consist of ordinary butyl rubber which has been bonded to the carcass (15) by an interposed tie ply of butyl rubber which has been vulcanized in accordance with the invention. Such an interposed tie ply facilitates the inclusion of highly unsaturated rubbers such as natural rubber, styrene rubber, nitrile rubber, or mixtures thereof, in the carcass.

The other layers of the tire, such as the intermediate carcass layer and/or the outer layer (including the tread area, the sidewall, and the outer bead portions, etc.) may also consist of butyl rubber vulcanized in accordance with the invention.

Rubber Springs

U. S. Patent 2,858,127, issued October 28, 1958 to Alexander E. Moulton, relates to rubber springs employing inclined bonded rubber and metal sandwiches where the rubber is used partly in shear and partly in compression, the relative proportions of which are determined by the angle of inclination to the line of action of the load.

The invention has for its object the reduction or elimination of end effects due to the use of continuous rubber sections and the reduction or elimination of metallic contacts which cause abrasion.



As shown in the schematic diagram, the rubber spring unit consists on conical inner and outer metal plates (1 and 2) to which are bonded an annular body of rubber (3). An annular recess (5) provided adjacent the inner metal conical plate (2) is so proportioned as to reduce or substantially eliminate tensile stresses at the surface of the rubber when the spring is under load. Owing to the shape of the surface of the rubber

with the PUNCH!

This sole is ROLLING WITH THE PUNCH. It is filled with nitrogen gas. This gas originates from OPEX 40 . . National Polychemicals nitrogen releasing blowing agent.

The introduction of nitrogen into your rubber soling will increase the buoyancy of the sole and literally put the "spring into the step." Nitrogen will give your sole excellent resistance to abrasion . . . cushioning the normal, every day "blows" from the walking surface.

Besides OPEX 40, our low cost nitrosoamine blowing agent, we also offer KEMPORE R-125, an aliphatic hydrazine derivative which produces odorless, nitrogen-filled sponge for soling . . . or other uses.

Call upon National Polychemicals for further information on this principle. Our "know-how", particularly in the soling field, can be put to work for you. We can save you money, improve your product and have your customers "walking on air."

NP NATIONAL POLYCHEMICALS, INC.

Wilmington, Massachusetts

The Best Method Yet Devised . . .

FOR DICING SHEET STOCK

The Famous CUMBERLAND "Stair-Step" Dicer

Here at last is the answer to your problems of dicing rubber or vinyl sheet stock. Produces perfect cubes ranging in size from ⅛ to ½" by merely changing knives.

Comes in two sizes designed to handle sheets up to 7" or 14" in width. Other sizes made to order.

Input speeds range from 10 to 125 feet per min. depending on material and size of cube desired.

The CUMBERLAND Rotary Chopping and Dicing Machine

As a chopper, this machine efficiently cuts rubber and vinyl slabs into small pieces. Two sizes available to handle stock widths up to 14 or 24 inches.

As a dicer in modified form, handles principally vinyl sheet stock. A less expensive machine though less universal than the "Stair-Step" Dicer shown above.

For Granulating Plastic . . .

Investigate Cumberland's complete line of granulating machines. Request Bulletin 590.

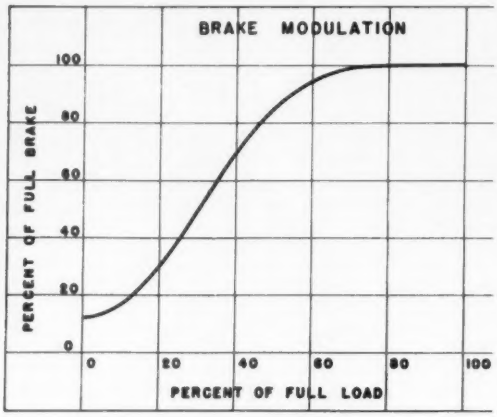
Write for Complete Information

CUMBERLAND Engineering Co. Inc.
DEPT. 3 · BOX 216 · PROVIDENCE · RHODE ISLAND
Builders of Better Machines for the Rubber and Plastics Industry

PATENT REVIEW

element, an internal cusp is developed when the spring is under load. To enhance the stability of the spring and to ensure a symmetrical deformation, an annular groove (6) is provided which determines the position of this internal cusp.

The outer surface (7) of the rubber body is generally of convex form having an area (8) adjacent the outer conical metal member of concave curvature, an abutment member (9) being provided adjacent the inner conical metal member against which the rubber body at this position bears when the spring unit is under load.



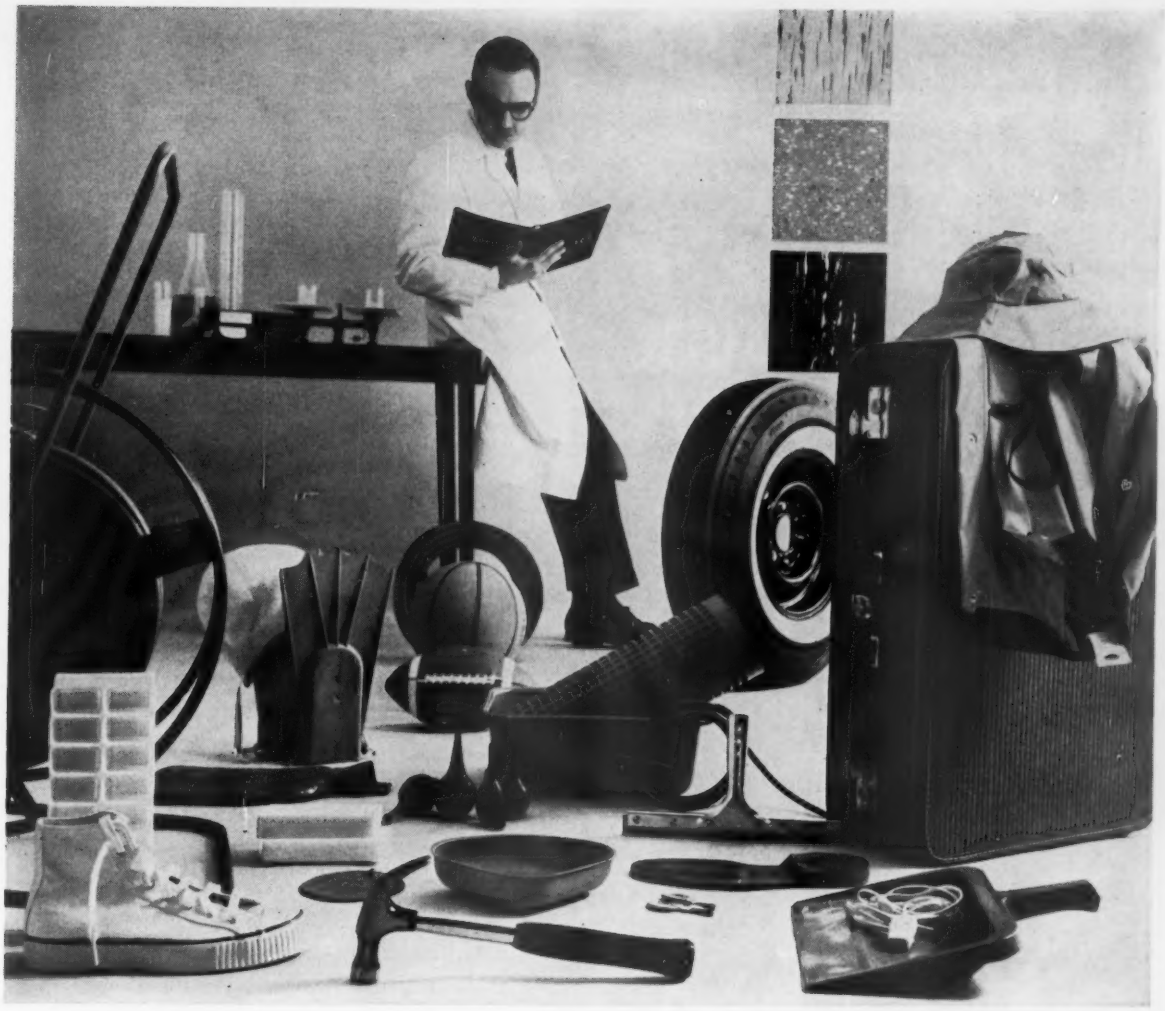
A typical load deflection curve is illustrated in the graph, which shows a rising rate as opposed to a linear rate. It will be noted that the spring exhibits a slightly falling characteristic up to the normal load position but thereafter a continual rising characteristic is exhibited.

Latex Sponge Rubber

U. S. Patent 2,858,282, issued October 28, 1958 to James T. Fairclough and assigned to United States Rubber Co., describes a method for making chemically frothed rubber latex sponge.

In carrying out the invention, the alkaline latex is compounded with conventional vulcanizing agents, such as sulfur, zinc oxide and accelerator; and preferably a thickening agent to facilitate shaping the latex and to prevent collapse of the foam structure during the initial expansion of the latex before gelling takes place; and the blowing agent (0.5 to 5 parts per 100 parts of rubber of the latex).

The blowing agent (e. g., azo-dicarbonamide) liberates nitrogen on heating and simultaneously forms acidic decomposition products which gel or coagulate the alkaline latex by reducing its pH to the point at which it forms an irreversible gel. It



Looking for an easier way to make it?

FIND IT IN FIRESTONE SYNTHETICS

Most complete line of easy-processing, product-specialized polymers in the industry today.

High standards of manufacture, uniformity and handy packaging make easy processing an advantage of *every* FR-S synthetic rubber. But the following types of FR-S were specifically developed to solve your toughest processing problems. This group of Firestone synthetic rubbers is only one of several groups designed to meet industry's varied needs.

FR-S 127, featuring a low mooney viscosity, eliminates the need for extensive breakdown of rubber in the manufacture of chemically blown sponge rubber products.

FR-S 146 has a lower plasticity than similar copolymers, making it adaptable for rapid mixing and high loading in the processing of light-colored and non-staining goods.

FR-S 154 offers important day-to-day uniformity in the compounding of camelback, tire treads and mechanical goods.

FR-S 155 is an extremely stable oil-extended rubber to which additional oil can be added for low-cost production of camelback, tire treads and mechanical goods.

FR-S 158, combining the stiffness of high styrene resin with the flex resistance of rubber, is a masterbatch prepared in the latex state for more perfect dispersion of resin. Ideal for shoe soles and other light-colored products.

FR-S 181 offers reduced mixing time, needs no peptizing agents in the manufacture of chemically blown sponge. Easily processed, too, for mechanical goods and adhesives.

FR-S 1009 is used with other rubbers to improve smoothness and speed of calendering or tubing, and to avoid distortion of uncured products. Widely used in insulated wire, hose, sheet goods and coated fabrics.

FR-S 1010 features a very low polymer viscosity, reduces milling time and requires no peptizing agents in the manufacture of chemically blown sponge. Useful, too, in mechanical goods and adhesives.

Each of these Firestone polymers is designed to provide specific product characteristics and production economies. Firestone Technical Service stands ready to help you choose exactly the right synthetic rubber or latex for the job from the largest and most complete line of product-specialized polymers in the industry. Write today. *Firestone Synthetic Rubber and Latex Company*, Akron 1, Ohio.

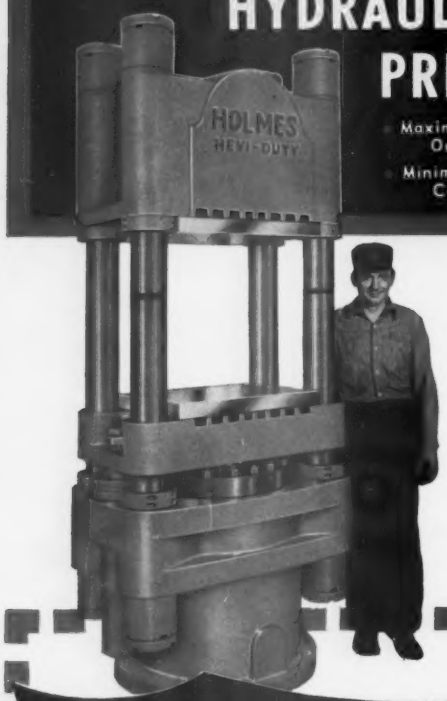
FR-S

Firestone

BETTER RUBBER FROM START TO FINISH

Copyright 1959, The Firestone Tire & Rubber Co., Akron ,Ohio

Now... PRECISION MOLDING
is NO PROBLEM
with the new and improved
HOLMES
HYDRAULIC
PRESS
Maximum Output
Minimum Cost



New Features--Precision Results

The new and improved Holmes Hydraulic Press retains all the features of its famous predecessors... PLUS...many outstanding improvements. These put it in a class by itself--for all kinds of general purpose work...and...special production where close tolerance is required. Low in price. Practically no maintenance. Will quickly pay for itself in any processing plant.

WRITE OR WIRE FOR SPECIFIC DETAILS--regardless of your particular requirements. With 52 years know-how specializing in machinery and molds for the rubber industry--Holmes can help you solve your problems, too, just as they have for so many others. No obligation, of course.

SEND FOR ILLUSTRATED FOLDER...TODAY

Stanley H. HOLMES Company
Successor to Holmes Brothers, Inc.

PATENT REVIEW

may be added as such or in an aqueous dispersion, or dispersed in an oil or ester plasticizer.

The thus prepared compound is then shaped by knife spreading on a surface. After shaping, it is heated at 80° to 130°C. In the course of a few minutes, the latex is frothed or blown by liberation of nitrogen from the blowing agent at the elevated temperature, and the formed froth is gelled by reduction of the pH to the gelling point by acidic reaction products from the blowing agent.

Age Retarding Product

U.S. Patent 2,852,583, issued September 16, 1958 to Herman Westlinning and Helmut Meis, assigned to Rutgerswerke-Aktiengesellschaft, describes a method of producing rubber with retarded aging properties.

It has been found that condensation products of styrene and styrene derivatives with carbazole are good age-retarding substances for natural and synthetic rubbers. They do not cause discoloration of rubber vulcanizates upon exposure to light and have a protective action approximating that of the secondary amines.

Rubber-Rosin-Asphalt Compositions

U. S. Patent 2,857,351, issued October 21, 1958 to James H. Carroll and assigned to Phillips Petroleum Co., describes a method for rendering rubbery crumb free-flowing, by incorporating a rosin acid into a natural or a synthetic elastomer, and then mixing with an asphalt.

Other Patents of Interest

Subject	Inventor or Assignee	Patent No.	Date
Vulcanizing apparatus for recapping tires	Robbins Tire & Rubber Co., Inc.	2,854,692	10/7/58
Retreading apparatus	Robbins Tire & Rubber Co., Inc.	2,854,693	10/7/58
Tire retreading apparatus	National Industries, Inc.	2,855,629	10/14/58
Manufacture of resin-reinforced shaped rubber articles from latex	Nederlandse Organisatie Voor Toegepast-Natuurwetenschappelijk Onderzoek t. b. v. Nivjverheid	2,856,316	10/14/58

Copies of any patents, including those described here, are available from the Commissioner of Patents, Washington 25, D. C., for 25 cents each. Do not send stamps.

"How do I buy TiO_2? Since we use around 500 tons a year to brighten and opacify our rubber stocks, we can't afford to take chances. I want the highest-quality pigment made . . . plus topflight service. That's why I specify Du Pont Ti-Pure*. It comes in the exact grade we need, it's delivered on schedule, and backed by a great service organization. I hear Du Pont is expanding production of 'Ti-Pure', *another* reason we can depend on ready supply!"

(Based on an actual conversation between a Du Pont Representative and a customer.)

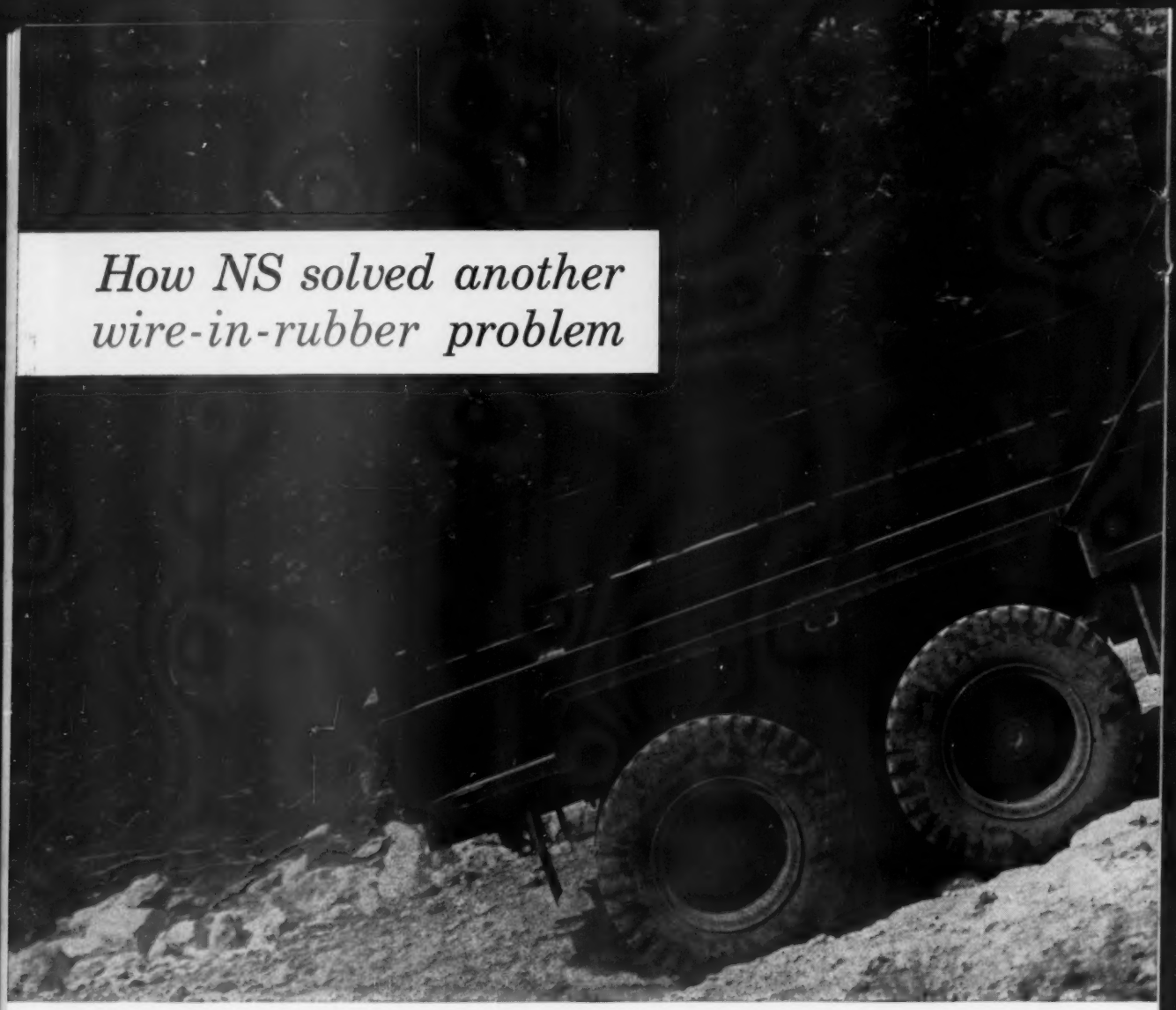
▶ Talked to *your* Du Pont Pigments Representative lately? He'll be glad to point out the "extras" you get with Du Pont "Ti-Pure" titanium dioxide pigments. Call him today! E. I. du Pont de Nemours & Co. (Inc.), Pigments Department, Wilmington 98, Delaware. In Canada: Du Pont of Canada Limited, P.O. Box 660, Montreal, Quebec.

*Du Pont's trademark for its titanium dioxide pigments

TI-PURE®
(Titanium Dioxide Pigments)

DU PONT

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY



How NS solved another wire-in-rubber problem

NATIONAL-STANDARD DEVELOPS SPECIAL BEAD WIRE FOR BUTYL TIRES

When several major tire manufacturers began experimenting with butyl rubber for passenger and military vehicle tires, a major problem was encountered—to develop a bead wire finish and butyl stock that provided the necessary adhesion.

NATIONAL-STANDARD engineers were called in by the tire manufacturers to develop a bead wire that would have the needed adhesive properties. Without such a bead wire, it would not be possible to utilize butyl in tires. Months of intensive experimentation and testing were spent by National-Standard engineers on a wide variety of metallic wire finishes, as well as fabricated braid and Pierce tape. These fabricated bead wires have proved particularly successful.

While their engineers in the laboratory at Niles, Michigan, were working on wire finishes and bead formations, National-Standard called in an independent research laboratory to find a butyl compound recipe that would give adhesion to bead wire finishes, and —at the same time—be compatible with the butyl stock used in the tire carcass.

RESULT—From these two concurrent research projects came the development of a bead wire and several butyl compounds which will provide satisfactory adhesion to meet tire manufacturers' special needs. Tire manufacturers have begun field testing of new butyl tires with National-Standard bead wire.

DEVELOPMENT ENGINEERING in new uses for wire in rubber products has made National-Standard the leader in this field for over 50 years. Wherever you have a wire-in-rubber problem, let National-Standard put their experience to work for you. For additional information write National-Standard Company, Niles, Michigan.

TIRE TESTS being conducted at proving ground on butyl tires for military vehicles show that butyl tires with new National-Standard bead wire hold up under rugged road conditions.

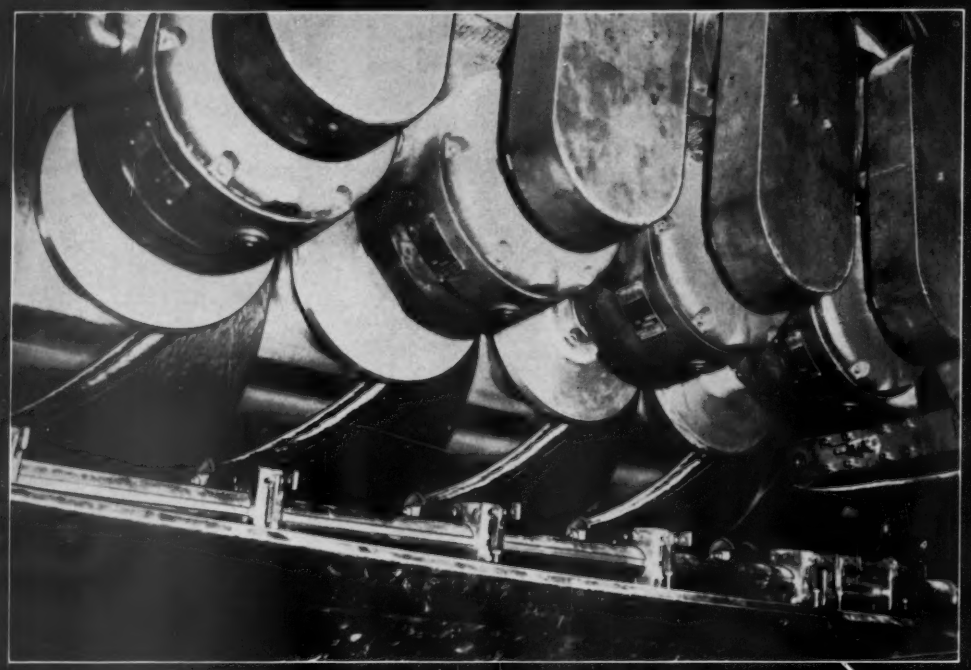
BRAIDED BEAD WIRE was subjected to stringent tests in National-Standard's laboratory to determine its adhesive properties with butyl.

Manufacturer of Specialty Wire for Rubber Products

NATIONAL STANDARD

DIVISIONS: NATIONAL-STANDARD, Niles, Mich.; tire wire, stainless, music spring and plated wires • **WORCESTER WIRE WORKS** Worcester, Mass.; high and low carbon specialty wires • **WAGNER LITHO MACHINERY,** Secaucus, N. J.; metal decorating equipment • **ATHENIA STEEL,** Clifton, N. J.; flat, high-carbon spring steels • **REYNOLDS WIRE,** Dixon, Ill.; industrial wire cloth • **CROSS PERFORATED METALS,** Carbondale, Pa.; decorative, commercial, and industrial perforated metals.

the AETNAMATIC MILL will mean fewer machines, fewer operations, and less inventory in your plant than now...



Curling cut strips advance stock from feed-in end at left to automatic discharge at right.

SIMPLIFY YOUR MIXING AND YOUR MILL ROOM

- In many applications, several passes through a Banbury or a mill can be reduced to one.
- The Banbury cycle can be shortened by having improved milling and blending on sheeting mill.
- The length of Banbury cycle is no longer controlled by the endurance of a sheeting mill operator.
- The batch obtains equal working throughout, insuring uniform plasticity and therefore an end to "off weight" extrusion or "off gauge" calendering.

you will SPEND LESS ...and GET MORE

Address Aetnamatic Inquiries to Hale and Kullgren, Inc.
613 East Tallmadge Avenue, Akron 9, Ohio

AETNA
DIVISION BLAW-KNOX COMPANY
STANDARD
PITTSBURGH, PENNSYLVANIA

White sidewalls stay white, not only because Johnny, despite Fido, cleans them, but because of modern compounding. Judicious selection of polymer, accelerator and antioxidant enables modern compounding and processing to build *lasting whiteness* into whitewalls

Why white sidewalls stay white

through pigmentation with TITANOX-A *anatase titanium dioxide.* This is the titanium dioxide of proven uniformity of whitening power for whitest whites of constant whiteness and durability in whitewalls.

Although critical whiteness calls for TITANOX-A anatase titanium dioxide, this does not exclude the stronger rutile TITANOX* pigments. For minimum loading of white and tinted stocks and maximum opacity in thin stocks, due to some 25% -or-higher tinting strength, TITANOX-RA (rutile titanium dioxide) is widely used. Similarly TITANOX-RA-50, combining exceptional ease of dispersion with high tinting strength, is preferred in many compositions. This pigment, as well as the "non-chalking" TITANOX-RA-NC, contributes to weather resistance. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; offices and warehouses in principal cities.

TITANIUM PIGMENT CORPORATION
SUBSIDIARY OF NATIONAL LEAD COMPANY

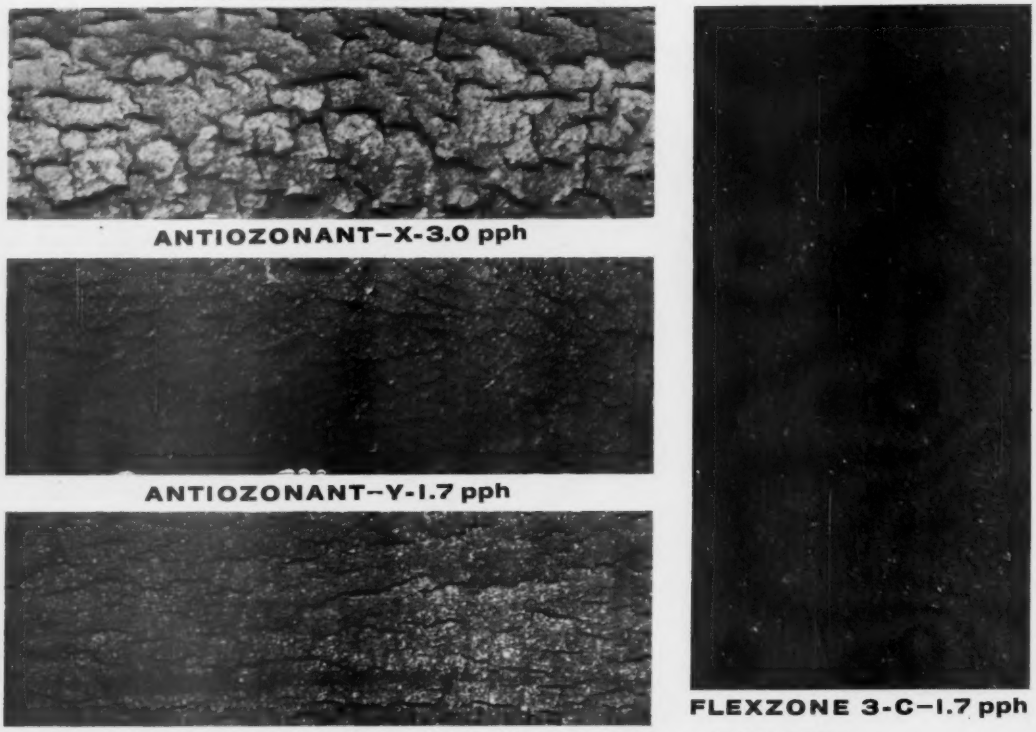
6712

*TITANOX is a registered trademark for the full line of titanium pigments offered by Titanium Pigment Corporation.

NAUGATUCK

LOS ANGELES SIDEWALL TEST: 8.00-14 SIZE TIRE

4-WAY ANTIOZONANT COMPARISON



TEST CONDITIONS: Vehicle Test, Los Angeles–12,500 Miles

NEW FLEXZONE 3-C

See us at A.C.S. Rubber Division Meeting, Los Angeles, May 13, 14, 15

Naugatuck Chemical now offers rubber compounders, processors, and end product users a chemical providing the best combination of resistance to

- **Ozone and Weather**
- **Oxygen**
- **Flex fatigue**
- **Heat**
- **Copper poisoning**

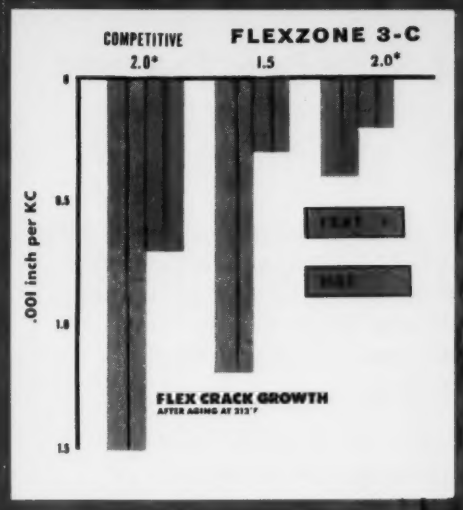
Dynamic outdoor tests have proved that tires protected with Flexzone 3-C surpass all others in:

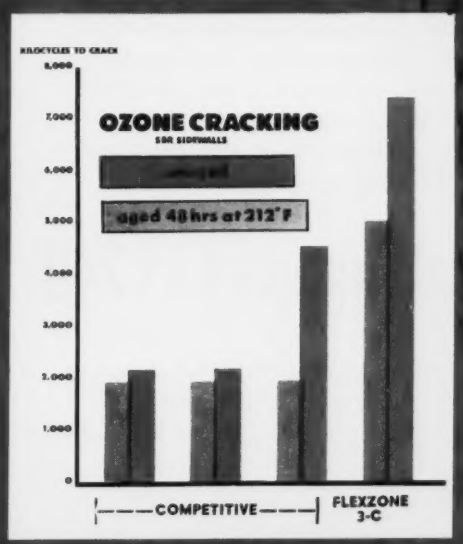
- **dynamic cracking by 100%**
- **flex-crack growth by 300%**
- **ozone cracking by 50%**

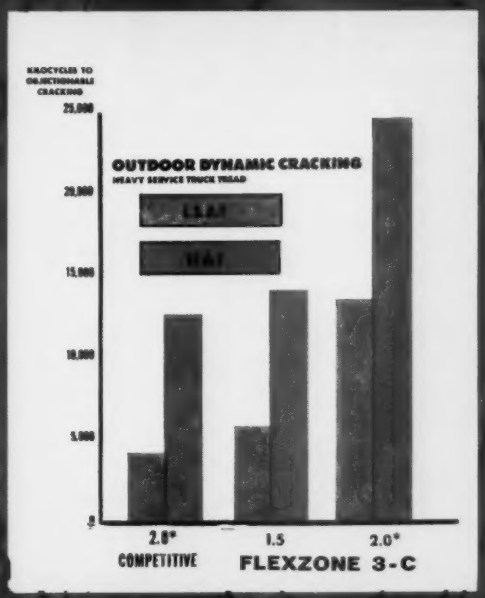
In *heavy-service nylon truck tires* Flexzone 3-C is the most effective inhibitor of groove cracking and cut growth.

Flexzone 3-C is

- **in easy-to-disperse flake form**
- **relatively non-migratory and non-volatile**
- **effective in natural and SBR**
- **not adversely affected by carbon blacks, plasticizers, accelerators, or other normal compounding ingredients.**







The above comparisons are made against control tests classed as true antiozonants and not simply standard antioxidants. *These contain 1.5 parts additional antioxidants.

The most effective antiozonant-antioxidant ever developed...triples a tire's flex life

For a finer rubber product, fewer adjustments and greater customer satisfaction, enjoy the protection only FLEXZONE 3-C offers. For samples, complete data, and technical assistance, contact your nearby Naugatuck Representative now.

Naugatuck Chemical

Division of United States Rubber Company

411F Elm Street
Naugatuck, Connecticut

Rubber Chemicals · Synthetic Rubber · Plastics · Agricultural Chemicals · Reclaimed Rubber · Latices · CANADA: Naugatuck Chemicals Division, Dominion Rubber Co., Ltd., Elmira, Ontario · CABLE: Rubexport, N.Y.

ROSS
Air Systems

Engineered Atmospheres for Better Processing

This refers to a foam rubber processing installation . . . a 65 foot long by 8 foot wide Ross Continuous Dryer and Curing Unit for drying C-Foam mattresses, furniture and aircraft cushions at the American Latex Corp. plant, Hawthorne, California.

Twenty minutes of the 45 minutes total continuous processing time are critically important because it is the curing period. Here is where the carefully conceived and controlled 'Engineered Atmosphere' comes into the picture. The temperature in this zone has to be held very close to 240°F by specially designed introduction, circulation and exhausting of hot air. Timing of travel has to be just right.

20 critical minutes at 240°F

Approaching the discharge end comes a complete reversal . . . a cooling zone, where residual hot spots, which could cause spontaneous combustion of the material in storage, are eliminated by the controlled introduction and circulation of cool air.

In this installation, there are at least four important elements of an 'Engineered Atmosphere' : zoning, circulation of hot air, temperature control and cooling . . . all precision problems. Drying, curing, baking, impingement, heating, cooling . . . these are typical of the operations on which Ross Engineers have concentrated their skills for more than thirty-seven years.

M-R

THE MIDLAND-ROSS GROUP OF COMPLEMENTING SERVICES

J. O. Ross Engineering, New York
John Waldron Corporation, New Brunswick, N. J.
Andrews and Goodrich, Boston
Ross Engineering of Canada Limited, Montreal
Ross Midwest Fulton, Dayton
Hartig Extruders, Mountainside, N. J.
Connor Ross Engineering Company, Ltd., England

J. O. ROSS ENGINEERING
Division of Midland-Ross Corporation

444 Madison Avenue, New York 22, N. Y.
ATLANTA • BOSTON • MT. PROSPECT, ILL.
DETROIT • LOS ANGELES • SEATTLE

new ORGANOSULFURS

from Pennsalt's expanded facilities

4P Mercaptan
(t-dodecyl mercaptan)
Isopropyl Mercaptan
t-Butyl Mercaptan
t-Nonyl Mercaptan

Four new organosulfur "building blocks" are now available in commercial quantities, the result of a recently completed major expansion of our organic sulfur chemicals unit. One of these valuable new intermediates could fit your requirements.

4P Mercaptan—an effective polymerization modifier for styrene-butadiene rubber, intermediate for surfactants

Isopropyl Mercaptan—potentially the lowest cost source of an alkyl mercapto group

t-Butyl Mercaptan—intermediate in organic synthesis, component of natural gas odorants

t-Nonyl Mercaptan—versatile intermediate for oil additives, agricultural chemicals, pharmaceuticals

Check this complete list of Pennsalt organosulfurs. Write or call Pennsalt for further information on these products and their derivatives.

Pennsalt Organosulfur Compounds

Commercially Available in volume

Methyl Mercaptan	t-Nonyl Mercaptan
Ethyl Mercaptan	t-Dodecyl Mercaptan
n-Butyl Mercaptan	Ethylthioethanol
t-Butyl Mercaptan	Thiophene
n-Octyl Mercaptan	Tetrahydrothiophene
Isopropyl Mercaptan	

Available in Developmental Quantities

n-Amyl Mercaptan
n-Hexyl Mercaptan
n-Decyl Mercaptan

See our Catalog in Chemical Materials Catalog

INDUSTRIAL CHEMICALS DIVISION
PENNSALT CHEMICALS CORPORATION
3 Penn Center, Philadelphia 2, Pa.

Akron • Chicago • Detroit • New York • Philadelphia • Pittsburgh • St. Louis • Appleton • Atlanta
Martin, Hoyt & Milne, San Francisco and Los Angeles • Airco Company International, New York
Pennsalt Chemicals of Canada Ltd., Oakville, Ontario

Pennsalt Chemicals ®
ESTABLISHED 1850

Can SYNPOL help make your product a better one?

✓ CHECK THE PRODUCTS YOU MAKE—SEE WHAT SYNPOL OFFERS

TIRES & CAMELBACK	Mechanically mixed, ultra-dispersed black and oil-extended masterbatches • premium quality at standard cost • shorter mix cycles, cleaner operation • promise of improved tread wear and resistance to cracking and cutting.
FLOOR TILE	Ease of processing • bright-colored, light-stable compounds • high filler tolerance • oil-extension for low cost.
ELECTRICAL INSULATION Jacket Stocks and Tapes	Low water absorption and good insulating properties • faster extrusion • clean, precise definition • outstanding dimensional stability.
SHOE SOLES & HEELS	Extreme resistance to wear, weather and moisture • exceptional dimensional stability • controlled "blow" in cellular stocks.
HOUSEWARES, TOYS, SPORTING GOODS, DRUG SUNDRIES	Non-staining compounds with high degree of transparency • permanent, white or pastel colors • high physicals and low cost.
MECHANICAL GOODS Calendered • Molded Extruded	Good building tack • high "green" strength • fast cures • smooth calendering and extrusion • compatibility with other rubber types for oil, weather and chemical resistance.
Other special polymers for adhesives, can closures, plastic compounding, sealants.	

SYNFOL synthetic rubber is used today by hundreds of the country's most experienced rubber processors... who have found that one or more of the various available grades helps them produce a better product, at low cost.

Offering the widest line of clear polymers in the industry, the latest development in ultra-dispersed black masterbatches, a comprehensive technical service program and an extensive warehouse operation, SYNPOL may well be the answer to *your* product, processing, inventory or delivery problem.

Whatever your product, you'll find it pays to keep in touch with TEXUS.

FOR TECHNICAL BULLETINS AND SAMPLES, WRITE US TODAY

TEXUS SYNPOL®

TEXAS-U.S. CHEMICAL COMPANY

260 Madison Avenue, New York 16, N.Y. • MUrray Hill 9-3322

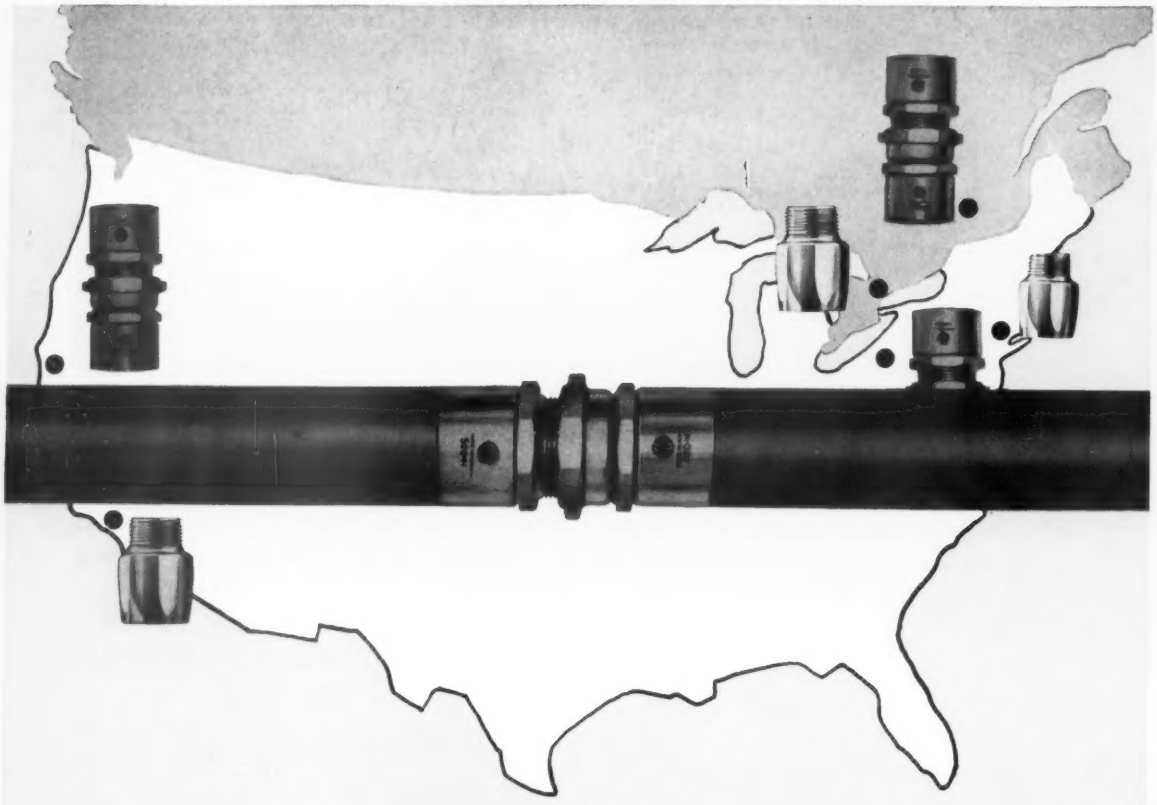
General Offices and Plants: Port Neches, Tex. TEXUS Research Center: Parsippany, N. J.

IMMEDIATE SERVICE

ANYWHERE in U.S. & Canada. Scovill's nation-wide facilities provide the industry's fastest service on fuel oil and gas pump couplings!

Only Scovill with its country-wide network of sales offices and warehousing facilities is equipped to give you such fast . . . efficient service. All orders for fuel oil and gas pump couplings received by Scovill are shipped *promptly*. And the sizes you want are always *immediately* available. That's because Scovill makes and stocks a complete range —from ¾" to 3" in fuel oil couplings . . . and all standard sizes in gas pump couplings.

The largest—and finest—sales and service force in the industry is ready to consult with you anytime, anywhere when you specify Scovill couplings. And—because you can buy *direct* from Scovill—you save up to ⅓ the former cost of oil and gas pump couplings. Get complete details now. Write: Scovill Manufacturing Company, Hose Coupling Department, Waterbury 20, Connecticut.



Hose couplings by **SCOVILL**

Main office: 99 Mill Street, Waterbury, Connecticut Cleveland: 4635 W. 160th Street Los Angeles: 6464 E. Flotilla Street Houston: 2323 University Blvd. San Francisco: 434 Brannan Street Toronto: 334 King Street, East

Give your braided hose high strength and low growth with Celanese FORTISAN-36 rayon

Braided hose reinforced with strong Celanese FORTISAN-36 gives you a unique combination of low growth and high burst resistance—plus the added advantage of reduced weight. FORTISAN-36 rayon yarn neither shrinks nor stretches under the influence of heat and moisture. This means better quality control during processing and stepped-up performance of the final product. For information on Celanese FORTISAN-36 and its uses in industry, write to: Celanese Corporation of America, Sales Development Dept., Fibers Div., Charlotte, N.C.

Celanese® Fortisan®

DISTRICT SALES OFFICES: 180 Madison Ave., New York 18, N. Y. • Room 10-141 Merchandise Mart, Chicago 54, Illinois
Western Merchandise Mart, Room 478, 1355 Market St., San Francisco, California
P. O. Box 1414, Charlotte 1, North Carolina • 200 Boylston St., Chestnut Hill 67, Massachusetts

EXPORT SALES: Amcel Co., Inc. and Pan Amcel Co., Inc., 180 Madison Ave., New York 16, N. Y

IN CANADA: Chemcell Fibres Limited, 1600 Dorchester Street West, Montreal, Quebec.

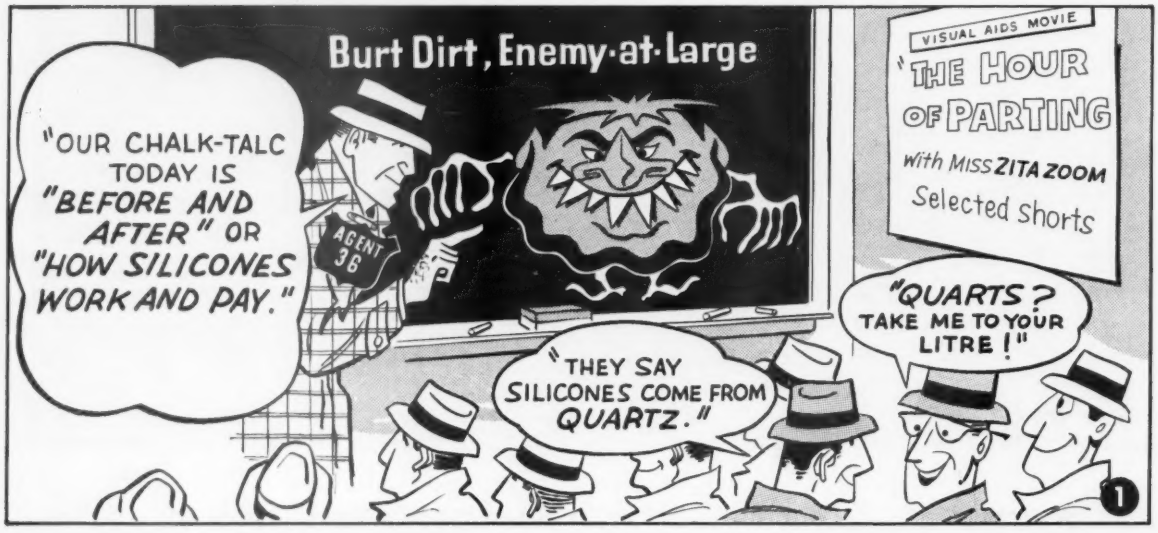
Fortisan-36 . . . a Celanese industrial fiber

AGENT 36

SILICONE SQUAD

HOW I TRAIN ADVICE SQUADS

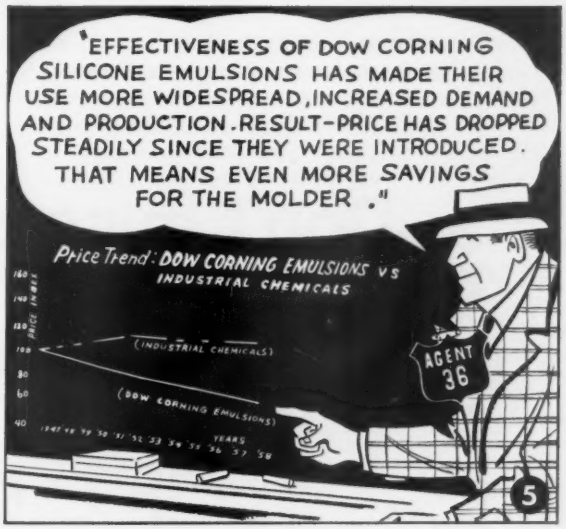
FROM THE OFFICIAL FILES OF DOW CORNING


Burt Dirt, Enemy-at-Large
"OUR CHALK-TALC TODAY IS "BEFORE AND AFTER" OR "HOW SILICONES WORK AND PAY."
AGENT 36
"THEY SAY SILICONES COME FROM QUARTZ."
VISUAL AIDS MOVIE
"THE HOUR OF PARTING
With Miss ZITA ZOOM
Selected Shorts
"QUARTS? TAKE ME TO YOUR LITRE!"
1

TIPTOE THRU THE TALCUM
"IN THIS PLANT YOU SEE MESS, WASTE MAINTENANCE, AND... WORST OF ALL.. MOLD DOWNTIME. THAT'S BECAUSE THEY DON'T USE SILICONES FOR MOLD RELEASE."
AGENT 36
"IT'S DIRT!"
"IT'S A BOG!"
"IT'S A DIRT BOG!"
2

"HERE'S A PLANT THAT USES SILICONE PARTING AGENTS. NOTE THAT THERE'S NO BUILD-UP IN MOLDS, THEREFORE, VIRTUALLY NO MOLD CLEANING. MOLD DOWNTIME IS CUT TO NIL. SCRAP GOES DOWN. BETTER PRODUCTS RESULT. MONEY IS SAVED! VERY LITTLE TALC IS USED, THE PLANT STAYS CLEANER-SO EVERYONE'S HAPPIER!"
AGENT 36
DOW CORNING 36
SMACK
CURSES!
"THIS PLACE IS PEACHY CLEAN, GENE!"
"SILICONES ARE BREAKING UP THAT MOLD GANG OF GRIME."
3

"YOU'VE SEEN DIRT CLOG A PLANT'S PRODUCTION, AND HOW SILICONE RELEASE AGENTS ELIMINATE THE MESS. BACK IN CLASS, I'LL SHOW YOU MORE FACTS..."
Rubberneck '36'
4


"EFFECTIVENESS OF DOW CORNING SILICONE EMULSIONS HAS MADE THEIR USE MORE WIDESPREAD, INCREASED DEMAND AND PRODUCTION. RESULT-PRICE HAS DROPPED STEADILY SINCE THEY WERE INTRODUCED. THAT MEANS EVEN MORE SAVINGS FOR THE MOLDER."
Price Trend: DOW CORNING EMULSIONS VS INDUSTRIAL CHEMICALS
PRICE INDEX
(INDUSTRIAL CHEMICALS)
(DOW CORNING EMULSIONS)
YEARS
AGENT 36
5

"NOW A WORD FROM A SLICK OPERATOR, SERGEANT SYL-OFF."
"ALWAYS REMEMBER - SYL-OFF IS THE PERFECT RELEASE COATING FOR BAGS OR UNIT CONTAINERS. NOTHING STICKS TO A SYL-OFF PAPER COATING. THAT'S WHY P.A.'S SPECIFY CONTAINERS COATED WITH SYL-OFF FOR CRUDE AND OTHER STICKERS."
AGENT 36
6

first in silicones

Dow Corning CORPORATION
MIDLAND, MICHIGAN

ATLANTA BOSTON CHICAGO CLEVELAND DALLAS
LOS ANGELES NEW YORK WASHINGTON, D.C.

Don't miss the important ACS Rubber Division meeting in California

The Division of Rubber Chemistry of the American Chemical Society will meet in Los Angeles on May 13, 14 and 15. Shell Chemical, the synthetic rubber producer on the West Coast, hopes you will attend.

Here is a wonderful opportunity to meet all your friends in the rubber industry. There'll be firsthand information on everything that's new about rubber. Come and see for yourself the metropolitan area that is one of the largest markets for tires and camelback in the U.S.A. —and growing every day!

In Southern California, Shell Chemical operates the world's only fully integrated plant making general-purpose synthetic rubber. Styrene, butadiene and the widest selection of rubber polymers and latices available from a single source are manufactured in our Torrance plant.

So, put a ring around May 13, 14 and 15 on your calendar—the days we will see you in Los Angeles!

SHELL CHEMICAL CORPORATION

SYNTHETIC RUBBER DIVISION

P. O. Box 216, Torrance, California

SHELL

capitol cues

THE PRESENT PRICE PLATEAU WON'T LAST LONG, in the view of government statistical experts. The present stability, which began last Summer, will probably continue until mid-summer; any increases or declines in consumer and wholesale prices during this period will be slight. But, as the second half begins, the inflation is expected to make itself felt again.

> Today's price stability is partly a result of rapidly rising productivity in manufacturing. For the first time in years, output per manhour is keeping in very close step with rising wage rates. This is helping to hold down unit labor costs. In addition, excess plant capacity is keeping the prices of manufactures competitive. And big crops have held food down.
>
> What will bring the current price lull to its close?
> - The productivity surge will slow as another round of wage increases begins and industry gets back closer to capacity.
> - A price hike in steel, after wage negotiations, will work itself through to the fabricating and consumer-goods levels.
> - An upturn in food prices will be reinforcing other advances.

THERE'S A BIG CHANCE OF A STEEL STRIKE this Summer. Both management and the union have already made it clear that they intend to stand firm in their bargaining. The union reportedly wants a large package, including a 25¢-an-hour wage boost, bigger pensions, more vacation time. The companies insist higher wages will mean higher prices and this, in turn, means a new boost for inflation. They're worried lest customers switch to other metals.

> If there's a strike, it will probably start on July 1 and may last as long as two months. If history is any guide, the settlement will give the unions a good part of what they will be asking for. That, in turn, will set the pattern for many other industries. Steel prices may go up about $5 per ton.

WATCH THE FIGHT ON "FEATHERBEDDING" just launched by the railroads. It is being carefully studied by other industries—building, broadcasting, printing, to name a few. The roads' drive aims at cutting costs by ending unneeded jobs and updating antiquated working rules. This would allow cuts in rates to increase competition with trucks and water-carriers. The drive may well set an example that in time will be followed by other industries.

THE 35-HOUR WEEK WON'T BECOME WIDESPREAD for a long time, despite the importance the unions are attaching to it. Labor leaders are seeking a way to create new jobs to help combat unemployment in factories and the growing trend toward automation. Their strategy will be to try first to get Congress to write the 35-hour limit into the Fair Labor Standards Act.

> Congressional action would be the short cut that would put the shorter workweek over in a hurry. (Requiring overtime after 35 hours would make it easier for unions to negotiate for fewer hours.) But, while many lawmakers sympathize with union aims, they aren't ready to add to industry's burdens.

capitol cues (cont'd)

THE FEDERAL BUDGET DEFICIT MAY BE LARGER this year than even the huge sum so widely predicted. The President foresaw a red-ink balance of $12 billion at the beginning of this year. Now, it looks as if the deficit will be closer to $14 billion. Tax revenues probably will dip $500 million under estimates. And spending for farm and defense will exceed estimates.

SMALL BUSINESS FIRMS WILL BE GETTING MISSILE CONTRACTS in considerable volume before too long. Up to now, the big companies have gotten the bulk of government work, most of which was research and development. Only the big firms are set up to do this kind of contracting. Now, with production on the rise, the big firms will be in a position to subcontract more component work.

How can a company find out who the key prime contractors are?

- The Small Business Administration maintains up-to-date lists at its regional offices in the country's leading cities.
- The Association of Missile and Rocket Industries also keeps such a list and also keeps a file on firms seeking missile work. It's located in the National Press Bldg., Wash. 4, D.C.

THREE RECENTLY PUBLISHED GOVERNMENT PAMPHLETS that you may find helpful in business: (All agencies offering them are located at Washington 25, D.C.)

- "Starting and Managing A Small Business of Your Own" gives expert advice and costs 40¢ at Government Printing Office.
- "Foreign Purchasing Agents" is a directory listing addresses in the U.S. It costs 10¢ from the Bureau of Foreign Commerce.
- "Products List Circular" reports on inventions for sale or lease. It's free from the Small Business Administration.

A NEW SOURCE OF HELP FOR SMALL BUSINESSES in solving management and research problems is now available—free of charge—from the Small Business Administration. The agency has set up a special division with its own staff to make studies of difficulties most common to broad groups of small firms.

THE FIRST SMALL BUSINESS INVESTMENT COMPANIES are now getting going, preparing to process initial loan applications. The Small Business agency has approved licenses for a score of these new-type lenders, who will be providing capital for growing firms. SBA can tell you where to get a loan.

The loans carry terms like these:

- Amount of any loan is limited to 20% of a lender's capital. By law, that capital will be a minimum of $300,000. But, many loans will be for less—$20,000, $10,000, or smaller.
- Duration may be indefinite, since the lenders will be taking debentures and converting them into stock in the borrower.
- Interest can go as high as the top allowed by your state.
- Purpose may be extra plant, machines, working capital, etc.

Beyond this, borrowers must be able to show adequate assets, good character, business experience, and legitimate purpose.

WASHINGTON DOESN'T EXPECT TENSION TO EASE in the Cold War with the Russians this year. As officials at the State Department see it, the Reds feel that their growing strength makes it unnecessary for them to yield on anything. Our diplomats fear a serious clash—possibly over West Berlin.

brother, that's for me!

New AMERIPOL MICRO-BLACK banishes black mess, boosts mixer output 25% or more

Why mess with the handling, storage, weighing, milling and mixing of carbon black? You can eliminate all those operations, and thereby increase your mixer output 25% or more, with new Ameripol Micro-Black masterbatch in your recipe. Here's why.

Carbon black is already integral in the Micro-Black masterbatch. You not only cut out all those processing costs, but you get cleaner, faster production. Warehousing is simplified because you eliminate one raw material. Handling is also simplified because Micro-Black masterbatch is shipped bareback. It does not cold flow.

You get superior carbon black dispersion and therefore greater abrasion resistance in your finished rubber products when you use Ameripol Micro-Black. For Goodrich-Gulf has achieved the ultimate in carbon dispersal with high liquid shear agitation at the latex stage.

New data book—For full information on the complete line of Ameripol Micro-Black masterbatches—and samples—write Goodrich-Gulf Chemicals, Inc., 3121 Euclid Avenue, Cleveland 15, Ohio.

Goodrich-Gulf Chemicals, Inc.

The Publishers of

RUBBER AGE

extend an invitation

to become

a subscriber to

ADHESIVES AGE

..an urgently-needed

NEW MAGAZINE SERVING THE ADHESIVES INDUSTRY

As readers of *Rubber Age* well know, adhesives are becoming an increasingly important part of manufacturing and distribution industries . . . speeding production, cutting costs, making new and improved products possible—across *all* industry. There are tremendous opportunities for growth, expansion, sales and profits for men and companies prepared to take advantage of them.

Now . . . for the first time—to provide important information on all phases of adhesives—there is a magazine, ADHESIVES AGE, that deals with adhesives exclusively; technology, production, application, sales. Think about it! In as much time as you want to spend with each issue, you will be expertly informed on the developments *you* are most interested in.

A Subscription will bring you 12 issues for only $5.00. Just mail the coupon below.

ADHESIVES AGE • 101 West 31st Street • N. Y. 1, N. Y.

Yes! I want to be a Subscriber to ADHESIVES AGE. Bill me $5 for the year (12 issues) starting with the next issue.
Note: Add 50c for Canadian subscriptions; $1.00 for foreign.

Name ..... Title .....

Street ..... ☐ Home ☐ Business

City ..... Zone.... State.....

Company .....

Products Made .....

459

Overseas

Paris—Societe Anonyme des Produits Chimiques Saint-Gobain recently placed chemical plants on stream at Berre, France, which are expected to enable Shell Saint-Gobain to make Epikote resins, carbon black and base materials for detergents and to expand its line of organic solvents.

New Delhi—The government of India is planning a petrochemical complex in the area of its Barauni refinery for the production of fertilizer, carbon black, synthetic rubber and plastics. Present plans call for completion in 1961.

Buenos Aires—Several American chemical concerns are reported to be interested in a $100 million petrochemical project in Argentina which would include production facilities for synthetic rubber, butadiene, and lamp black. The products would be derived from oil produced by the Argentine State Oil Monopoly (YPF). Among the interested American firms are Koppers Co., Chemical International, Fish International, and Texas Butadiene.

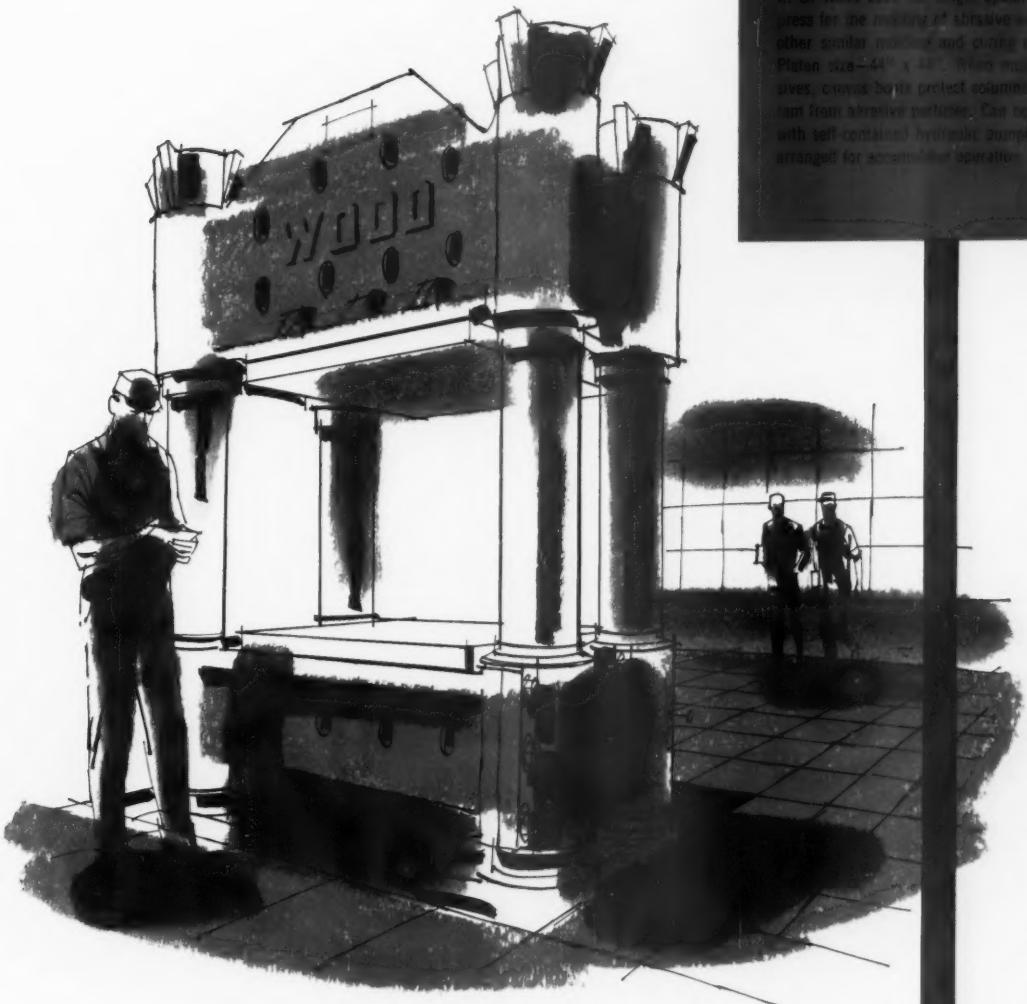
Istanbul—A new chemical plant to be erected in Istanbul, Turkey, through a $6.1 million loan from the United States Development Loan Fund, will produce polyvinyl chloride resins, caustic soda, calcium carbide and related chemicals. The facility will be owned by a subsidiary company to be set up jointly by Vinylex, Ltd., a private Turkish manufacturing and trading company; two Italian firms, Sicedison, S. p. A., and Oranzio de Nora; and the Monsanto Chemical Co., St. Louis, Mo.

Hague—N. V. Ver. Ned. Rubberfabrieken, Heveadorp (Gld.), and the Rubberfabrieken Ir. L. M. Glazener, N. V., Harderwijk, have come to an agreement regarding the sale of all the shares of Rubberfabrieken Ir. L. M. Glazener N. V. to N. V. Ver. Ned. Rubberfabrieken. Under the agreement, Rubberfabrieken Ir. L. M. Glazener, which will continue to exist as such, will maintain and further extend its production. The Heveaconcern, after taking over this company, will comprise three factories at Heveadorp (Gld.), Raalte (O) and Harderwijk.

Rome—Montecatini has begun construction of a new $95 million petrochemical plant at Brindisi having a projected capacity of 700,000 metric tons of chemicals annually. The plant will produce several plastics, including polyethylene and Montecatini's new "Moplen"; isotactic polypropylene; polymers for synthetic fibers; aldehydes; alcohols; and organic solvents. This will be the seventh and largest unit in the Montecatini group for processing hydrocarbons.

How to save money on your next press: apply your specs to a basic R. D. Wood design

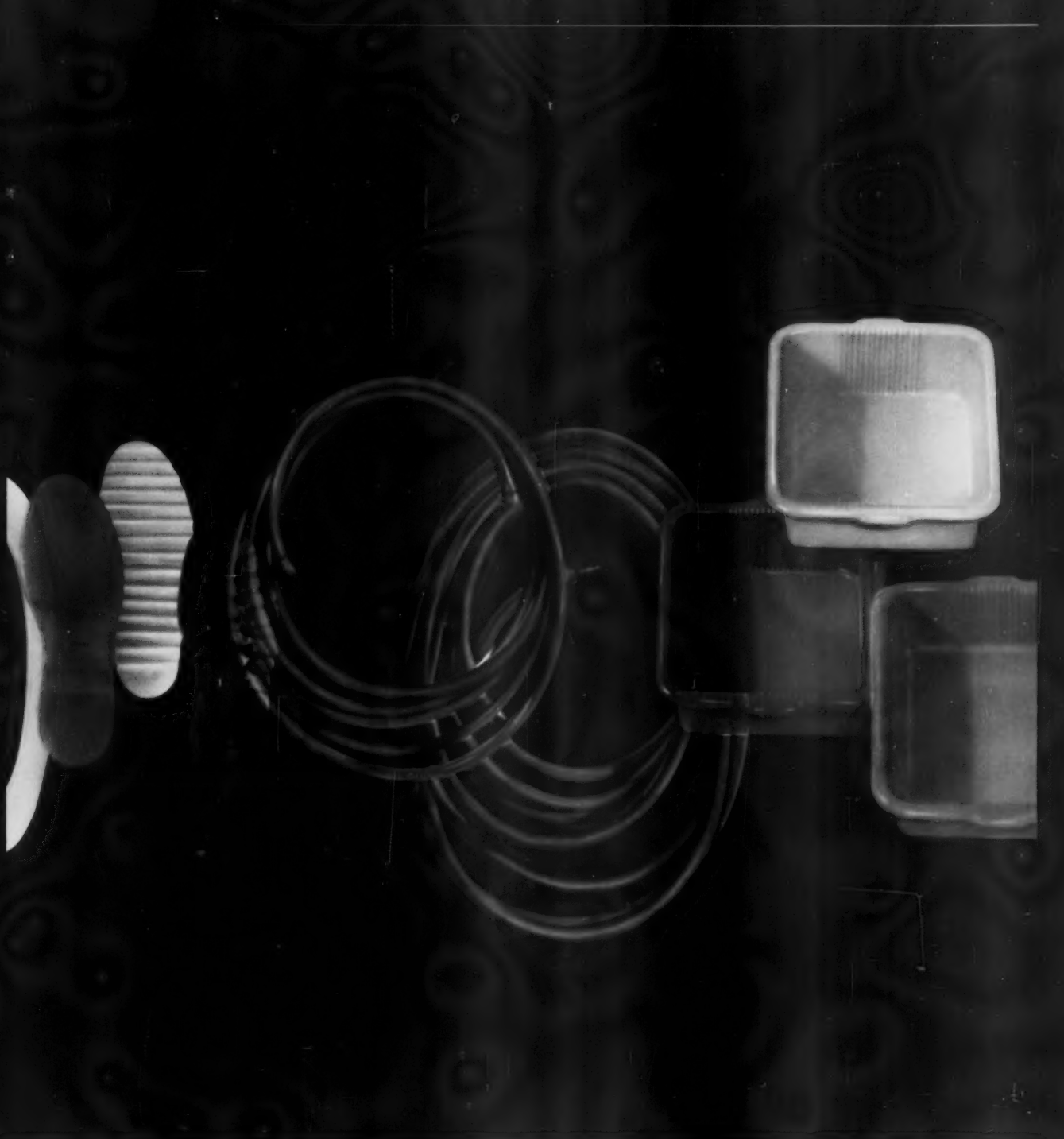
The result will be exactly *what you want*—just as surely as if you had it designed from scratch. And its cost will be much lower. Working with numerous basic models, R. D. Wood engineers can save considerable design time and expense, and still incorporate *your* specifications in the finished machine. You're sure of its quality, too. For every Wood Press is built by experts using selected materials. This brings additional saving from smooth, dependable performance; fast, economical production; trouble-free operation. *Before* you begin planning your next hydraulic press, consult Wood.



R. D. WOOD COMPANY

PUBLIC LEDGER BUILDING • PHILADELPHIA 5, PENNSYLVANIA

HI-SIL®, CALCENE®, & SILENE® CREATE COLORED GOODS THAT MOVE



Sports equipment, housewares, soling, automotive products . . . bright sales and profit pictures for manufacturers of colored rubber goods make it obvious: color is here to stay—and the more products of all types color's appeal enhances, the better consumers and retailers like it.

Hi-Sil, Calcene and Silene make color practical. These three exceptionally high quality white reinforcing pigments from Columbia-Southern permit uniform production of white stocks that take subtle pastels, vivid brights, rich deep tones—accompanied by excellent physicals to stand up under extreme degrees of punishment.

A brand-identifying color might well make *your* goods move faster. If you've already switched to color, upgrading specific properties with Hi-Sil, Calcene or Silene could be helpful. For individual formulation assistance, just address us at Pittsburgh or the nearest of our fourteen District Sales Offices.

Columbia-Southern Chemical Corporation, One Gateway Center, Pittsburgh 22, Pennsylvania. Offices in principal cities. In Canada: Standard Chemical Limited.

COLUMBIA-SOUTHERN CHEMICAL CORPORATION

A Subsidiary of Pittsburgh Plate Glass Company

What happens when you

add a pinch of permanence?

When you're trying to give a shoe-sole compound more of the qualities you want it to have, don't forget this powdered resin.

A little of it, in an SBR compound, can increase the hardness and boardiness.

A little more—on the order of 20 parts to 100 of elastomer (with some nitrile as a common flux)—can further improve hardness and stiffness, as well as resistance to abrasion and heat distortion.

It reduces tensile strength *less* than a thermoplastic resin would. Because it is heat-setting, the properties it brings to the stock stay there through higher temperatures—as high as 250°F.

You get more durability—more permanence—than with other types of resins. You pay less for it.

This is just one of 33 Durez resins helping compounders make better rubber products. Some of these resins harden and reinforce nitrile rubber. Others add permanence traits to natural rubber and Neoprene. Still others strengthen the grip of solvent-type adhesives, or bond nitrile rubber to metal during molding.

To meet your processing conditions, you can get these resins in powder, lump, liquid, and emulsion forms. If you'd like to know more about them, write for the illustrated bulletin, "Durez Resins in the Rubber Industry."

DUREZ PLASTICS DIVISION

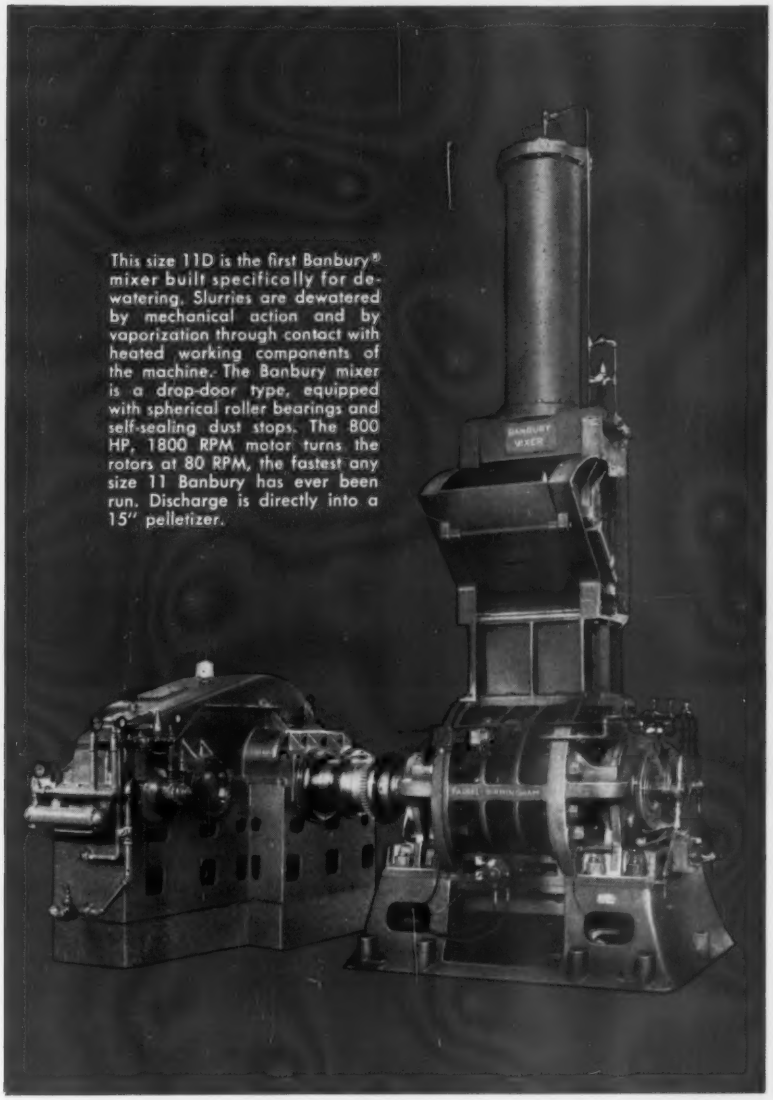
104 WALCK ROAD, NORTH TONAWANDA, N. Y.

HOOKER CHEMICAL CORPORATION

HOOKER CHEMICALS PLASTICS

NEW BANBURY® FOR DEWATERING

designed to produce 6000 pounds of dry rubber per hour



This size 11D is the first Banbury® mixer built specifically for dewatering. Slurries are dewatered by mechanical action and by vaporization through contact with heated working components of the machine. The Banbury mixer is a drop-door type, equipped with spherical roller bearings and self-sealing dust stops. The 800 HP, 1800 RPM motor turns the rotors at 80 RPM, the fastest any size 11 Banbury has ever been run. Discharge is directly into a 15" pelletizer.

Now... another Farrel first: The dewatering of synthetic rubber slurries by Banbury® mixer. According to tests conducted at the company's process laboratory, this size 11D Banbury mixer will produce 400 pounds of dry rubber in 4-minute cycles. This means an hourly output in the neighborhood of 6000 pounds.

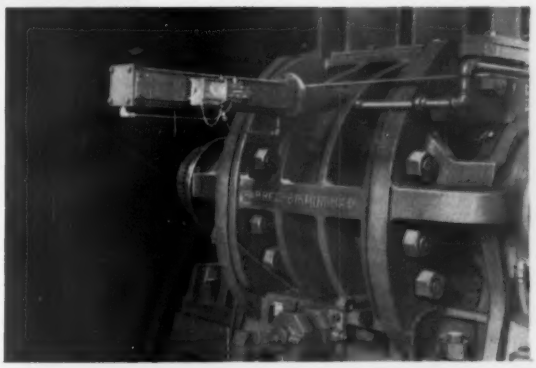
In addition to high production rate, dewatering by this method offers other important advantages. When changing stocks, costly cleaning operations are not required. Normal wear of parts will not seriously affect production. Also, the equipment can be used for other purposes, such as making carbon black masterbatches, the carbon black being added as a slurry during the dewatering cycle, or as a dry powder afterward.

Ask for further details of dewatering by Banbury mixer.

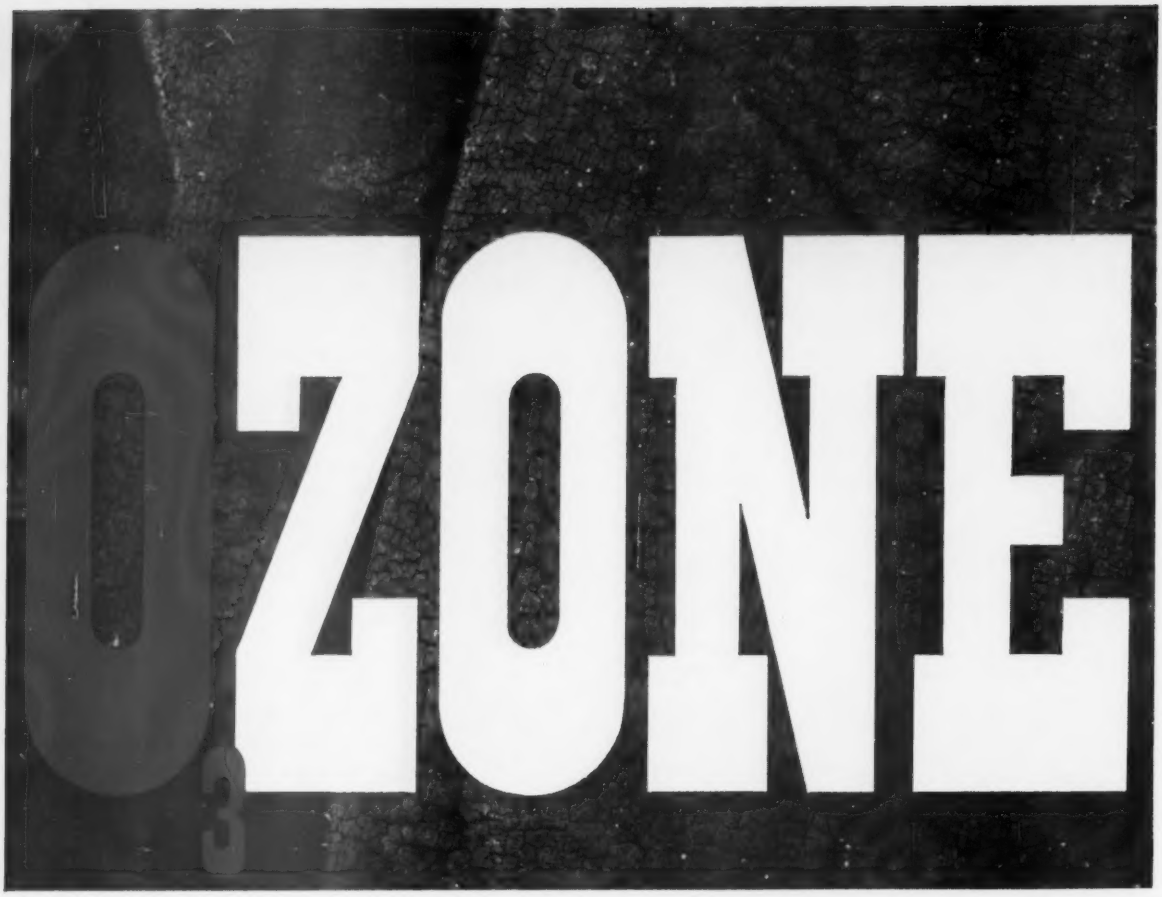
FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONNECTICUT
Plants: Ansonia & Derby, Conn., Buffalo & Rochester, N. Y.
Sales Offices: Ansonia, Buffalo, Akron, Chicago, Ann Arbor (Mich.), Los Angeles, Houston, Fayetteville (N. C.)
European Office: Piazza della Republica 32, Milano, Italy

FB-1165

FARREL®



The dewatering valve, which can be seen in the illustration at the right, opens when floating weight reaches down position. Water, which has been squeezed from the slurry, is then drained or pumped out.



How to arrest its attack on rubber products

Ozone attack is now recognized as the major cause of cracking and checking in stressed rubber products.

The mechanism of this type of deterioration is attributed to the chemical attack of ozone upon the carbon-to-carbon double bonds of unsaturated elastomers. Through a rather complex reaction the double bond is broken. This places additional stress upon adjacent chains and increases their sensitivity to ozone attack. Thus a continuing reaction occurs, leading to the development of fissures perpendicular to the direction of the stress.

To combat the deteriorating effects of ozone, rubber chemists have several approaches open to them:

(1) Addition of waxes which migrate to surface areas

(2) Protection of surface areas with an inert coating

(3) Incorporation of antiozonants

Of these three methods, the use of antiozonants is the most effective for rubber products under stress. Antiozonants are easily incorporated into the rubber during processing and slowly exude to the surface during use. Because they interrupt the chain-breaking reaction between ozone and unsaturated elastomers, antiozonants provide a continuing protection which cannot be equalled by any physical method.

Eastman's Eastozone antiozonants protect rubber products more effectively at lower cost than do other types of commercially-used antiozonants. Using Eastozone antiozonants, compounders often can cut antiozonant requirements in half and still get the same ozone resistance, measured by static or dynamic exposure tests.

Give your mechanical goods or tire stocks maximum service life at minimum cost by incorporating Eastozone antiozonants in your rubber recipes. Ask your nearest Eastman representative for samples of Eastozone antiozonants or write to EASTMAN CHEMICAL PRODUCTS, INC., subsidiary of Eastman Kodak Company, KINGSPORT, TENNESSEE.

Eastozone **Eastman Rubber Antiozonants**

SALES OFFICES: Eastman Chemical Products, Inc., Kingsport, Tennessee; Atlanta; Chicago; Cincinnati; Cleveland; Framingham, Massachusetts; Greensboro, N. C.; Houston; New York City; St. Louis. **West Coast: Wilson Meyer Co.,** San Francisco; Los Angeles; Portland; Salt Lake City; Seattle.

As Soule Sees It...

by Kenneth J. Soule

Two-Way Stretch

The word "stretch" means many things to many people. To a rabid baseball fan, it can refer only to the ritual of rising to his feet in the seventh inning for the double purpose of loosening his joints and wishing his team well. The horse-race enthusiast, on the other hand, prefers to associate the word with the straight portion of the race track which comes down to the wire. In terms of time, stretch often indicates the extent or duration thereof, as in the statement, "He slept twelve hours at a stretch." And so it goes, through a long series of examples.

For present purposes, stretch will be used to indicate the properties or quality which a material possesses to extend, expand, or elongate before it breaks. The material under investigation will be limited to Kraft paper.

C. A. Shoudy of the West Virginia Pulp and Paper Co., discusses this subject in an article which appears in the *Southern Pulp and Paper Manufacturer,* and entitled "The Clupak Story." Mr. Shoudy points out that conventional Kraft paper has a stretch of 1½ to 2 per cent when measured in the direction in which it travels on the paper making machinery (lengthwise of the fibers). The stretch across the sheet as manufactured is considerably greater. One of the important uses of Kraft paper is in single-wall and multi-wall packaging in which myriads of different products are packed. In this case, rough handling is not unusual and the success or failure of a particular type and style of bag hinges largely on the combined strength plus stretch which the paper from which it is fabricated possesses.

These facts have been common knowledge in the paper industry, but until 1954, no successful method of overcoming the known shortcomings of bag paper had been discovered. That year, West Virginia Pulp began to investigate the possibility of adapting to commercial paper machine operations, the patented process by which Sanford L. Cluett, vice-president of Cluett, Peabody and Co., had produced stretchable paper in narrow widths (up to 2 inches) in his laboratory. This was accomplished by means of a rubber blanket supported on two carrier rolls and one nip roll. The latter also acted to compress the blanket as it contacted the chrome-plated dryer drum.

At the same point that the wet sheet of paper was held by the blanket and as it slipped on the drum, the paper underwent compression. The finished paper thus produced was found to have 500 per cent more lengthwise stretch than conventional paper and slightly greater crosswise elongation. While the tensile (lengthwise) was decreased about 25 per cent, this was not important since the toughness of the finished sheet is measured by the product of elongation times the tensile. Obviously, the new paper is many times tougher than the standard product. This has also been demonstrated by the greatly improved service secured from bags made of the new paper.

The task of converting the results of laboratory findings into full-scale commercial practice required much additional experimentation and many pilot plant studies. Since the extensible unit would ultimately become an integral part of a Kraft machine which was 264 inches wide, and would cost $25 million, it is not surprising that a total of about three years elapsed before final successful production was reached. In fact, it is a tribute to all concerned with the project (including, of course, the manufacturers of the vitally important rubber blankets) that Mr. Cluett's dream was at last made a reality and that in Clupak, a spectacular Kraft paper has been produced. This sets new performance standards for the heavy paper-bag industry.

How is Your Eye-Q?

Far be it from me to knowingly and intentionally become involved in the whys and wherefors of female pulchritude. The subject is much too controversial, for one thing, since personal tastes vary so widely and often with such violence. However, I am chemically intrigued, in the abstract, by the matter of eye adornment, whether achieved by the use of eyebrow pencil, eye-lid wash, or by the addition of artificial eyelashes to those provided by Mother Nature. (Adornments like black eyes, regardless of their origin, are definitely excluded from this discussion).

The latest entry into the ranks of synthetic eyelashes appears to be a plastic creation developed by the scientific husband and wife team of Marguerite and Sol Goodman, late of the University of Washington, Seattle, Wash., and the College of the City of New York, respectively. They now operate as the Campus Chimes Cosmetics Corp.

The construction of their gadget is too involved and complicated to expound here. For those who are interested in learning more about its method of manufacture, I suggest that you consult *Industrial and Engineering Chemistry,* Vol. 50, No. 8, for a detailed description which included schematic drawings of the floor plan. On the other hand, you may prefer to buy several gross of the articles in question and amuse yourself by scientifically dissecting them or pulling them apart to the accompaniment of "She loves me, she loves me not."

Suffice it to note here, that these Goodman eyelashes involved several materials, either inherently or in the process of manufacture. These were DuPont Mylar film, polyvinyl chloride, toluene, acrylic resin, silica, calcium carbonate, FDA certified colors, lanolin and polyisobutylene. This is unquestionably an impressive list. Even more spectacular is the way that the individual properties and peculiarities of these materials have been employed to produce a novel article which would seem to merit some kind of an Emmy Award on sheer inventiveness and ingenuity. Whether or not they will get an Emmy or an Oscar, or whether Emmy will snare Oscar by fluttering her beautiful new lashes

As Soule Sees It (Cont'd)

at him, time alone can tell. Anyhow girls, good fluttering to you all.

Straight Shooting

Nylon was introduced to the American public about twenty years ago in the form of strong, sheer, filmy ladies' hosiery. Since that time, it has been adapted for service in a multitude of objects, ranging from textile to industrial machine parts. The latest, and perhaps most spectacular, application for nylon has been announced by the Remington Arms Co. Nylon has been used in the company's new 22 long rifle, the "Remington Nylon 66." This new weapon combines structural nylon and Ordnance steel to produce what is claimed to be the most dependable and accurate autoloader ever made.

In this autoloader, nylon is used for the rifle stock, available in either mohawk brown or seneca green. Since nylon is practically immune to the effect of sunlight, water, mud, extremes of heat and cold and other destructive agents commonly encountered in hunting service, it seems reasonable that it would retain its strength, beauty and dimensional stability much better than even the finest woods commonly used for gunstocks. In addition, the use of structural nylon permits three-point bedding, such as is customarily found only in costly bench rest instruments.

Another advantage claimed for the new rifle is that no lubrication is required except for the usual protective oiling of the metal parts since all moving steel parts ride on nylon bearings. In spite of its ruggedness, accuracy and dependability, the Nylon 66 is exceptionally light and weighs only four pounds, about 15 per cent below the weight of a comparable model using conventional materials. The quoted retail price is $49.95.

All in all, Remington's new entry into the small arms field seems to have so many vital features in its favor that this construction could conceivably set a new pattern for the industry. Its most serious weakness, at the moment, could be that it is going to be difficult, if not impossible, to work it into the regular script of any of the flood of TV Westerns now cluttering and clattering up the air waves.

Rubber á la Mode

The over-sized pot containing all the entries in the synthetic-natural rubber sweepstakes is really boiling today. With the surprise announcement in the daily press that Shell Chemical Corp. and the U. S. Rubber Co. are in commercial production of a polyisoprene rubber whose properties exactly duplicate those of natural rubber, the race between the Big Four becomes increasingly torrid, and the competition with tree-grown rubber even more interesting.

The new Shell product which, oddly enough, is called simply "Shell Isoprene Rubber", is said to sell for 30c a pound, f. o. b., Torrance, Calif., the point of manufacture. For the time being, the complete output will go to U. S. Rubber but when the present five ton daily production reaches the expected annual figure of 15,000 to 20,000 tons, Shell will also sell to other consumers.

Previously, the polyisoprene rubbers of Goodyear and Firestone, labeled "Natsyn" and "Coral", respectively, seemed to be way out in front in the competition to achieve commercial production. Goodrich was also well along in its development work. Now, however, all this has been changed with the U. S. Rubber-Shell Chemical bombshell. It is not clear exactly what the effect will be on the current polyisoprene plans of other rubber companies. There can be little doubt, however, that the "Shell Isoprene Rubber" will not be the only star in the rubber firmament for too long a time.

In any case, the successful production of polyisoprene rubber at a price which is competitive with the best grades of the tree-grown variety provides another weapon in the arsenal of the free world. While it is true that the synthetic rubber, GR-S, developed and produced under war-time stress did an admirable job in replacing and reinforcing our dwindling natural rubber supplies, nevertheless, it is comforting to know that we now appear to have another ace in the hole if, for any reason at all, we should ever be completely denied access to natural rubber.

As far as the peace-time competition between the new rubber and natural rubber is concerned, it seems probable that each will find its own niche, depending on the prices, availability and particular properties required for the end products involved. Increased yields from the latest strains of rubber trees, and improved handleability in the new types of Superior Processing Rubbers will stand natural rubber in good stead in the up-coming struggle. It will be thrilling to stand in the wings and watch the impending drama while wishing all the protagonists well.

Ripless Laminate

A new entry into the fabric-reinforced plastic film field is called "Griffolyn". As reported in *Chemical and Engineering News*, it is produced by the Griffolyn Co. under manufacturing rights from Bjorksten Research for Industry. The latter developed the basic idea while working on an Air Force contract for the development of particularly strong materials which would be suitable for use in parachutes.

The "fabric film" as it is called, consists of a fabric of non-woven fibers sandwiched between two layers of plastic film. The entire assembly is held together by an adhesive which remains permanently tacky. The fiber mat may consist of almost any natural or synthetic fiber, but at present, Dacron is chiefly used. A variety of plastic materials can be used for the outer layers, depending on the end use. The adhesive presently employed has not been disclosed. Its purpose, aside from binding the parts together, is said to be primarily to allow the fibers to slide and bunch up under stress and thus to prevent the sheet from ripping.

Although it is theoretically possible to produce "Griffolyn", in an almost infinite variety of styles and thicknesses, the most popular weights now being made range between 1½ and 7½ ounces per square yard. To illustrate the exceptional strength of the new fabric film, it is said that in a sample weighing 4½ ounces per square yard and having a fiber insert of 36 strands per square foot, a force of 240 pounds is required to continue a rip which was started by cutting. For comparison, it requires from 7 pounds to 25 pounds to continue a rip in untreated or plastic coated fabric of a comparable weight. Ripping, eh wot?

You get easy extrusions with **Philprene*** !

CURRENT PHILPRENE POLYMERS		
	NON-PIGMENTED	PIGMENTED WITH PHILBLACK*
HOT	PHILPRENE 1000 PHILPRENE 1009 PHILPRENE 1001 PHILPRENE 1010 PHILPRENE 1006 PHILPRENE 1018 PHILPRENE 1019	
COLD	PHILPRENE 1500 PHILPRENE 1502 PHILPRENE 1503	PHILPRENE 1605 PHILPRENE 6611** **Pigmented with EPC Black
COLD OIL	PHILPRENE 1708 PHILPRENE 1712	PHILPRENE 1803 PHILPRENE 6605 PHILPRENE 1805 PHILPRENE 6608 PHILPRENE 6604 PHILPRENE 6620

Operational difficulties are for the birds! The correct Philprene rubber will give you easy extrusions, plus superior physical properties as well! For cable jackets, try Philprene 1605 or Philprene 1706. Makers of hard rubber products can improve mold flow and get smooth, true-to-the-die accuracy with Philprene 1708. There are many other Philprenes compounded for fabricated or calendered goods . . . for light-colored items . . . for applications where extra toughness and durability are required.

Check with your Phillips technical representative. It's his job to help you every step of the way from recipe to finished product. His technical knowledge and Phillips long experience with rubber, plus the facilities of an up-to-date technical service laboratory, are at your service. This valuable technical assistance can mean a definite increase in your profits.

*A trademark

PHILLIPS CHEMICAL COMPANY

Rubber Chemicals Division, 318 Water St., Akron 8, Ohio.

District Offices: Chicago, Dallas, Providence and Trenton.
West Coast: Harwick Standard Chemical Company, Los Angeles, California.
Warehouse Stocks at Akron, Boston, Chicago, and Trenton
Export Sales: 80 Broadway, New York 5, New York.
European Office: Phillips Chemical Company, Limmatquai 70, Zurich 1, Switzerland

THE CASE OF THE
Customer's Curse
I DON'T GIVE A @!X-#* ABOUT YOUR PROBLEMS WITH CONTAMINATED SOLVENT...YOU MEET YOUR DELIVERY DATES FROM NOW ON OR I'LL CANCEL YOUR @:+!!! CONTRACT!
ONE MORE PRODUCTION HOLD-UP CAUSED BY CONTAMINATED SOLVENT AND YOU'RE THROUGH!!
I THINK I'VE FOUND THE ANSWER, BOSS...SKELLYSOLVE! LES WEBER IS HERE RIGHT NOW!
PURCHASING AGENT
YOU CAN FORGET YOUR PROBLEMS WITH CONTAMINATED SOLVENT WHEN YOU USE SKELLYSOLVE, AND...
...YOU WON'T HAVE ANY TROUBLE WITH LATE DELIVERY, EITHER! HERE'S WHY:
1. Orders phoned direct to Skellysolve plant.
2. 9 out of 10 cars shipped next day.
3. Shipping information sent promptly.
4. Skellysolve is quality-checked during production and before shipping.
5. Technical service backed by over 25 years of Skelly experience.
...LIKE YOU TO MEET THE YOUNG MAN WHO SOLVED OUR PRODUCTION PROBLEM!
SURE GLAD I GOT WISE TO SKELLYSOLVE!
LATER
PURCHASING AGENT

Many companies in your industry depend on Skellysolve for exacting quality, prompt shipment, and expert technical service. Get more complete facts by writing or calling us today at LOgan 1-3575, Kansas City, Missouri.

Skellysolve for Rubber and Related Industries

SKELLYSOLVE-B. For making quick-setting cements for the shoe, tape, container, tire and other industries. Quick-drying, with no foreign taste or odor, in dried compound. Closed cup flash point about -25°F.

SKELLYSOLVE-C. For making quick-setting cements with a somewhat slower drying rate than those compounded with Skellysolve-B. Closed cup flash point about 13°F.

SKELLYSOLVE-H. For general use in manufacturing operations and cements, where faster evaporation rate than that of Skellysolve-C is desired. Closed cup flash point about -16°F.

SKELLYSOLVE-L. For general manufacturing operations where a medium evaporation rate is required. Closed cup flash point about 12°F.

SKELLYSOLVE-R. For general use in tire building and a variety of other manufacturing operations and cements. Reduces evaporation losses. Medium quick final dry. Lessens bloating and skinning tendency. Closed cup flash point about -25°F.

Ask about our new Skelly Petroleum Insoluble Grease.

SKELLY **Skellysolve**

SKELLY OIL COMPANY
TULSA, OKLAHOMA
Industrial Division:
605 West 47th Street, Kansas City 41, Mo.

LOW INITIAL COST... LOW MAINTENANCE... OPERATING EASE

Make

NRM RUBBER STRAINERS

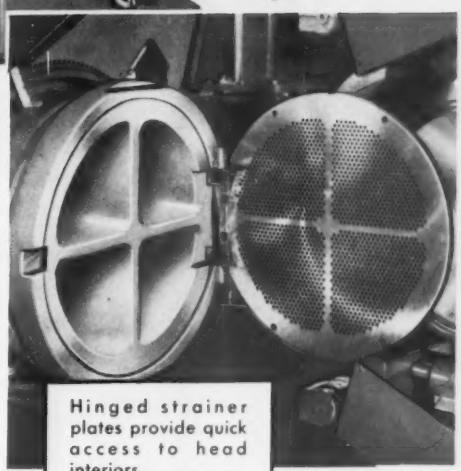
NRM 8½" RUBBER STRAINER

the most time-saving cost-cutting strainers in the industry

AVAILABLE IN 6½", 8½", 10" and 12" SIZES

Long, trouble-free service life is assured by *practical* design and rugged, heavy duty construction throughout. Replaceable cylinder liners are of corrosion and wear resistant Xaloy 306. Transmissions use cut steel, heat treated herringbone gears and heavy duty roller bearings. Feed screw thrust loads are fully absorbed by oversize thrust bearings. All bearing and gear lubrication is automatic.

Important operating features contributing to higher production are: 1), quick-opening air clamps with instant release, saving 5 to ten minutes over manually opened types; 2), strainer plates hinged directly to the head, providing quicker access to plates and cavities for cleaning; and 3), offset and undercut feed boxes, providing maximum and *uniform* stuffing of the cylinder, whether hand or strip fed, and eliminating cylinder "voids."



Hinged strainer plates provide quick access to head interiors.

Contact us for full engineering information and performance data. See for yourself why rubber goods manufacturers the world over rely on NRM Rubber Strainers for sustained high production at minimum maintenance cost.

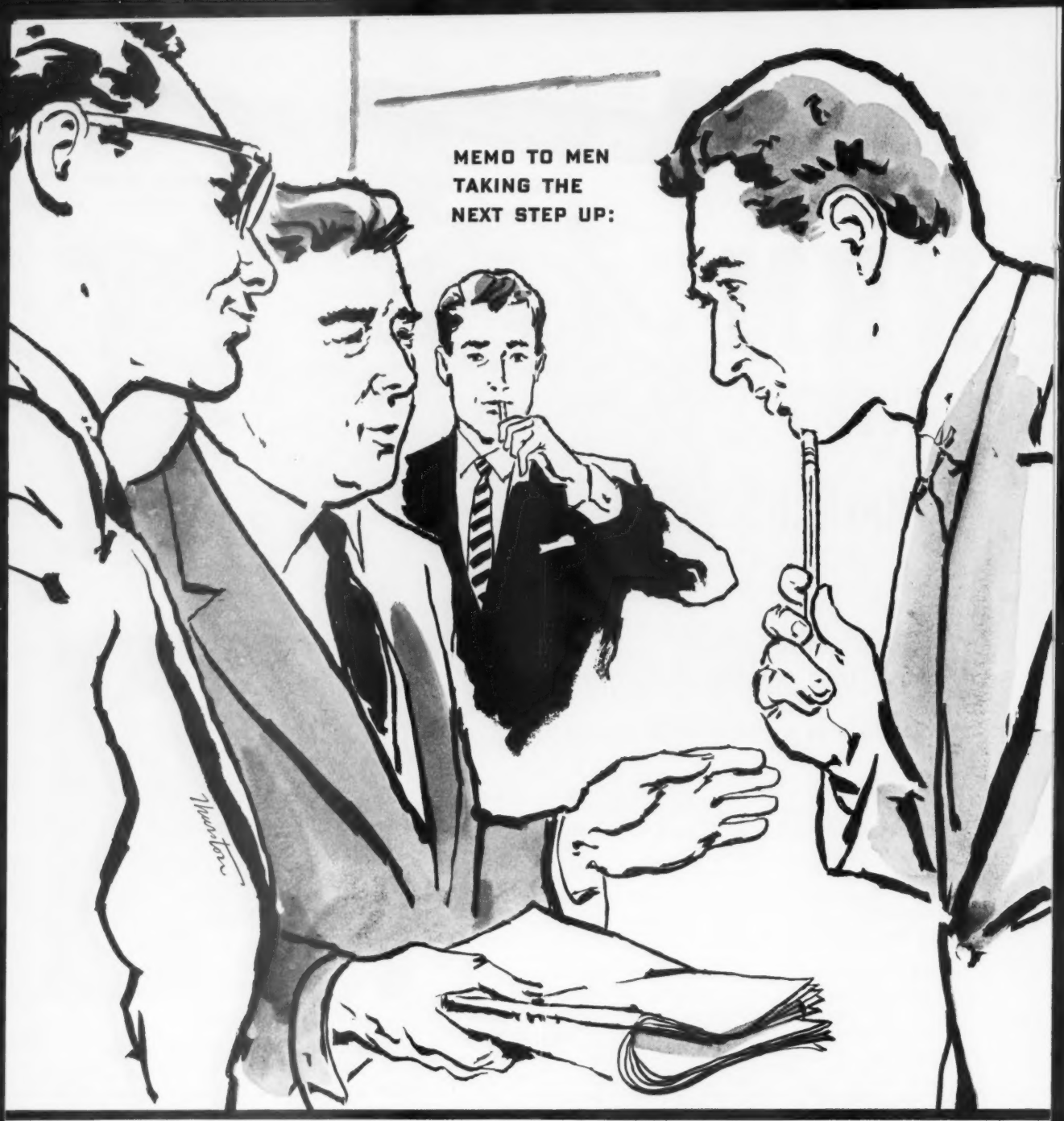
2079-A

NATIONAL RUBBER MACHINERY COMPANY

NRM

General Offices and Engineering Laboratories: 47 West Exchange St., Akron 8, Ohio
West: S. M. Kipp, Box 441, Pasadena 18, Cal.
Export: Gillespie & Company, 96 Wall St., New York 6, N. Y.

Creative Engineering



WHERE THERE'S BUSINESS ACTION THERE'S A BUSINESSPAPER

Inside information—when it's genuine—is invaluable when it comes to picking a winner. It's also invaluable when it comes to doing a better job in business.

Men on top and men on the way up in business know this. They're constantly on the alert for information—complete information, sound information, timely information. They get that information most consistently by habitual reading of the businesspaper they subscribe to in their particular field.

They read for profit, not pleasure. They read carefully, thoroughly—looking not only for information, but for fresh ideas, new methods, new products they can put to work. And they find so much that's worthwhile in the advertising that they read it with the same searching concentration they devote to the editorial pages.

You can profit by emulating the reading habits of key men at every level. Subscribe to your businesspaper. Read every issue. Carefully. Thoroughly. Searchingly.

RUBBER AGE

101 West 31st Street, New York 1, New York

REPLACED: SIX HORSE-DRAWN STREET CLEANERS

In 1905 the first horse-drawn street cleaner was put in service in Milwaukee, the home city of its inventor, Louis Kindling.

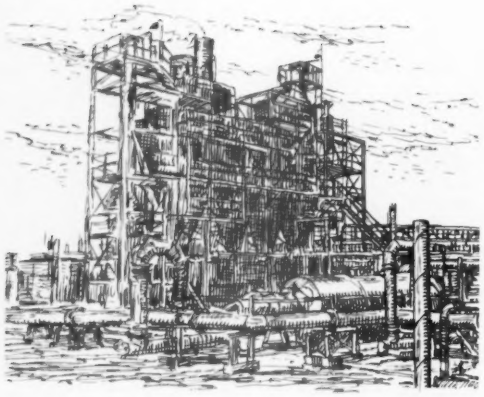
Just 10 years later this motor-driven street cleaner was introduced there. Called a "squeegee," it replaced six of the earlier models and at the same time reduced operating costs.

The vehicle rode on solid rubber tires, and heavy rubber strips that spiraled around a roller beneath it forced wet debris into the gutter as the truck moved along the streets.

Without rubber the development of such equipment would have been impossible. Without continuous developments in scientific rubber compounding, progress in all transportation fields would still be hardly beyond the "horse-drawn" era.

UNITED CARBON BLACKS have been specified by discerning compounders for practically every rubber application for more than three decades. UNITED CARBON BLACKS are made to meet today's — and tomorrow's — needs!

UNITED CARBON COMPANY, INC.



KOSMOS CARBON BLACKS

are made for a world of compounding needs

KOSMOS 70 ISAF Ideal for toughest treads, maximum mileage tires, for gruelling high speed highway operations, and for high electrical conductivity.

KOSMOS 60 HAF Recommended for good processing, highest reinforcement, extra mileage tires, tread rubber (camelback), and outstanding resistance to cuts and cracks.

KOSMOS 50 FEF Superior as processing aid; for imparting good, smooth, fast extrusions; for maintaining dimensional stability; for dissipating heat.

KOSMOS 40 HMF Recommended for good processing, substantial reinforcement, ready dispersion, high rebound, low heat build-up, high resistance to flex.

KOSMOS 35 GPF For tire body stocks and general purpose applications where high resiliency, low heat build-up, high strength at elevated temperature and good flex resistance are essential.

KOSMOS 20 SRF Excellent for highly loaded rubber goods; easy and cool mixing; semi-reinforcing; low in heat generation; high in resilience.

KOSMOBILE 77 EPC Recommended for good processing, for high level of reinforcement, high tensile strength, good resistance to abrasion.

KOSMOBILE S-66 MPC For rubber goods requiring high reinforcement, high tensile strength, highest resistance to tear and good resistance to abrasion.

KOSMOS BRAND

UNITED CARBON COMPANY, INC.

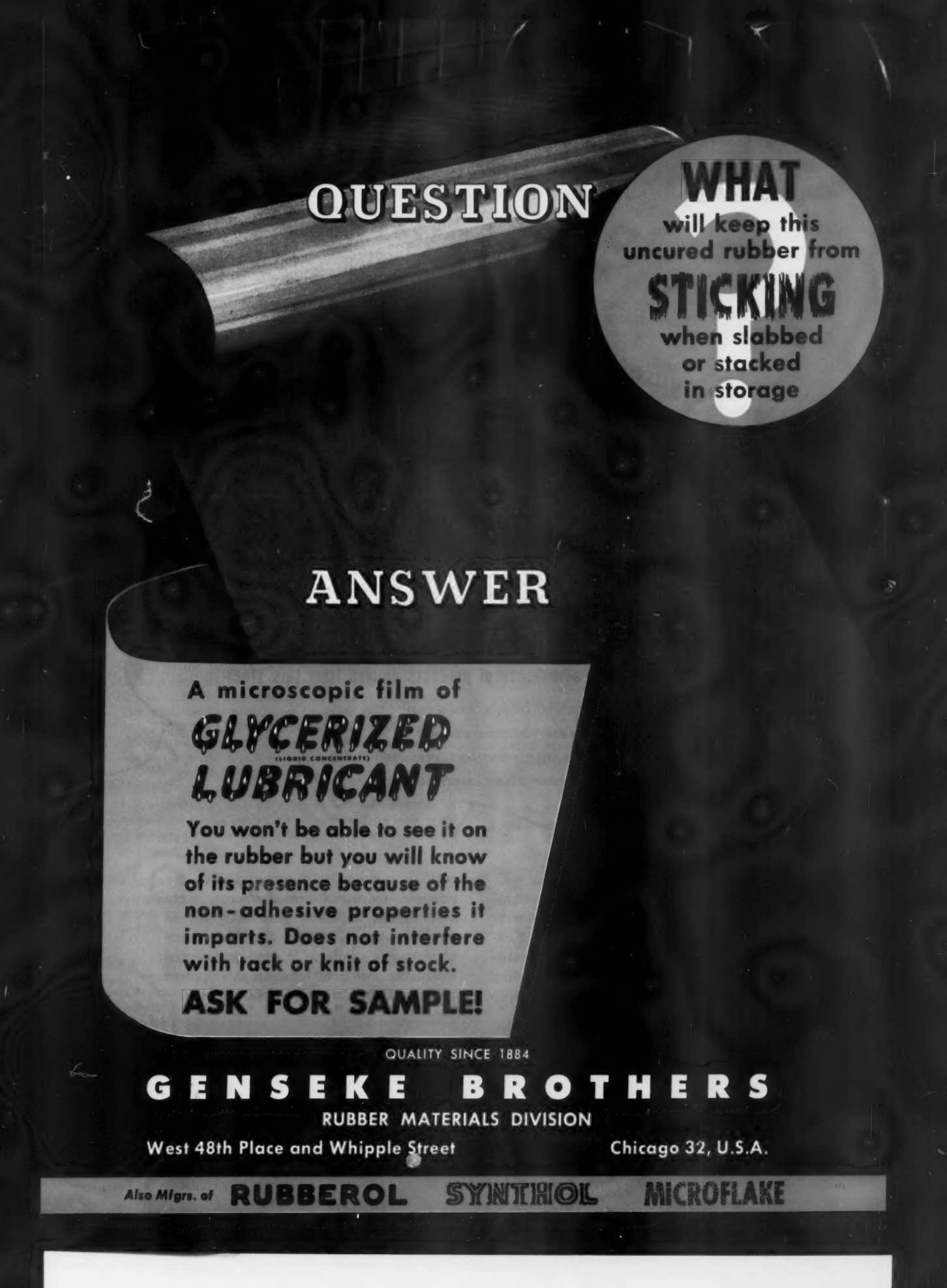
A subsidiary of United Carbon Company

CHARLESTON 27, WEST VIRGINIA

NEW YORK AKRON CHICAGO

BOSTON LOS ANGELES MEMPHIS

IN CANADA: CANADIAN INDUSTRIES LIMITED


QUESTION
WHAT
will keep this
uncured rubber from
STICKING
when slabbed
or stacked
in storage
?
ANSWER
A microscopic film of
GLYCERIZED
(LIQUID CONCENTRATE)
LUBRICANT
You won't be able to see it on the rubber but you will know of its presence because of the non-adhesive properties it imparts. Does not interfere with tack or knit of stock.
ASK FOR SAMPLE!
QUALITY SINCE 1884
GENSEKE BROTHERS
RUBBER MATERIALS DIVISION
West 48th Place and Whipple Street
Chicago 32, U.S.A.
Also Mfgrs. of RUBBEROL SYNTHOL MICROFLAKE

SOLUTIONS TO YOUR COMPOUNDING PUZZLE...

New Polyurethane-type rubber

GENTHANE-S

Consider these advantages of products derived from this stock

- VERY GOOD OZONE RESISTANCE
- EXCELLENT OIL RESISTANCE
- REMARKABLE HEAT RESISTANCE
- OUTSTANDING ABRASION RESISTANCE

If you're looking for rubber stock with unique qualities to solve tough product requirements, Genthane-S may offer an easy solution to your problem. Combining excellent ozone, oil, heat and abrasion resistance with ability to be processed on existing equipment, this stock has numerous applications in specialty-compounding . . . for example, industrial tires, footwear, valve diaphragms, impellers, grommets and oil field supplies. Genthane-S polyurethane elastomer is available in semi-commercial quantities now. Send for a sample shipment and complete literature today!

THE GENERAL TIRE & RUBBER COMPANY

CHEMICAL DIVISION, DEPT. A

AKRON, OHIO

Creating Progress Through Chemistry

Chemical Division GENERAL

THE GENERAL TIRE & RUBBER CO.

• Industrial production of butyl rubber started in Paris, France, in March, at the Societe du Caoutchouc Butyl (SOCABU), according to Esso Standard, one of the founders of the firm. Two oil companies, Esso Standard, French affiliate of Standard Oil of New Jersey, and Cie Francaise de Raffinage, have already begun producing isobutylene, the basic material for making synthetic rubber. Societe du Caoutchouc Butyl will produce 20,000 tons of butyl rubber a year.

• U. S. Rubber Co., New York, N. Y., has announced that the company will assist the Nitto Tire Co. of Tokyo in the production of pneumatic tires and tubes under a technical service agreement which was recently approved by the Japanese government. The agreement also provides for production by Nitto of U. S. Royal Brand tires for export sale by U. S. Rubber, thus providing the American firm with a base for expanded business in Asia. U. S. Rubber will furnish Nitto with modern production techniques and product designs.

• Ten thousand tons of asbestos will be exported to Austria by Russia during 1959 under a long term trade agreement between the two countries which was signed in October, 1957.

• A group of three prominent United States rubber manufacturers are reportedly studying the possibility of setting up a factory in India for the manufacture of 20,000 to 30,000 tons of synthetic rubber per year.

• In England, too, there are complaints about the lack of interest in foreign languages. Reports on the 1958 examinations of the British Institution of the Rubber Industry, pointed out that the translations were of generally poor standards. In French, "bande de roulement" (tire tread), was translated, when not completely ignored, as 'milled', 'revolving belt', 'rolling belt', 'stretched condition', and even as 'stick to the rolls'. "résistance à la rupture" (tensile strength at break) was usually translated as 'cracking resistance', 'tensile stress', 'tear resistance', 'resistance to rupture', or some such variant. "Cuireux" (leathery) appeared as 'curious' (curieux) and 'waxy' (cireux).

In German "hochspannungsgeraete" (high-tension apparatus), which is clearly electrical from the context, was translated varyingly as 'tensile testing', 'high extension', 'high tension recovery', 'high stability', etc. "Quelle" (source) was confused with "quellen" (to swell). "An stelle, wo" (at places, where) appeared as 'substance', 'submitting', 'on standing' and 'the placing'.

• According to statistics released in Zurich, Swiss rubber imports, including natural, synthetic and waste rubber, amounted to 782 tons in December, compared with 1,563 tons in November and 1,130 tons in December of the previous year. Of this amount, Malaya supplied 382 tons; the United States, 254 tons; West Germany, 66 tons; Canada, 41 tons; and Indonesia, 31 tons.

• The Soviet Russian trade paper *Rubber and Resin*, published a feature article called "The Reinforcement of Rubber Latices by Combining Latex Mixtures with Condensation Resins", which discussed investigations of the possibility of increasing the strength of coating compositions by introducing dissolved condensation resins into latex. The addition of glyptal resins to Latex SKS-30 and in a DVKhB-70 aqueous solution strengthened the coating compositions made from the above latices. Glyptal resins stabilize latex mixtures and make it possible to omit the addition of casein. They also increase the strength of raw and vulcanized coating compositions.

The addition of 10 parts/weight of the resin to 100 parts/weight of polymer was found to give most satisfactory results. The resin comprises 200 parts/weight of phthalic anhydride and 95 parts/weight of glycerin. The mixture is heated for 32 minutes at 160°C and diluted with water (60 parts/weight). The final product has a pH 7. The effect of the resins on the strength of the coating compositions was investigated by testing their physico-mechanical properties. Samples not containing the vulcanizing group were dried at 70°C for 20 minutes and the coating compositions containing the vulcanizing group were vulcanized in an autoclave at 140°C for 40 minutes.

Experiments were carried out on strips measuring 10 x 5 x 0.3 mm. The dependence of the strength of raw and vulcanized coatings made from Latex SKS-30 on the resin content and relaxation curves of the vulcanized coatings with varying glyptal resin content were given. The latex, DVKhB-70 was also tested with the addition of glyptal resins. This was found to increase the strength of both vulcanized coatings and coatings which did not contain vulcanizing agents but which were heated for 40 minutes at 140°C. Unvulcanized mixes, dried at room temperature for three days, showed no improvement. Glyptal resins can be added to the latex DVKhB-70 in the ratio of 10 parts/weight to 100 parts/weight of a polymer without the addition of a stabilizer.

• As the second step in the formation of the European Common Market, European rubber industries have synchronized their interests. Five National Associations of the rubber industry in the European Common Market met on January 16 in Milan, Italy. Included were the Associazione Nazionale fra le Industrie della Gomma, Cavi Elettrici ed Affini; Chambre Syndicale Belge des Industriels du Caoutchouc; Nederlandse Vereniging van Rubberfabrikanten; Syndicat National du Caoutchouc des Plastiques et des Industries qui s'y

On the Continent (Cont'd)

Rattachent; and Wirtschaftsverband der deutschen Kautschuk-Industrie e. V.

The group signed an agreement to establish the Bureau de Liaison des Industries du Caoutchouc de la CEE (BLIC). This will be an office for the representation of the common interests of all five rubber associations, to be located in Brussels, Belgium, for the study and mutual solution of problems which interest European industries that process rubber and similar materials.

The association will be represented by a presiding counsel which has the competency of a court and is composed of the presidents of member associations. During 1959, Germany will nominate the president and Italy, the vice-president. After an executive secretary has been nominated, the office will be formally opened.

• According to an official announcement, based upon the decision of the governing authority of the Mutual Trade Assistance, East Germany will stop making heavy trucks and tractors because the Czechoslovakian Republic will specialize in this line. Factories which previously manufactured the tractors in East Germany will manufacture small automobiles.

• An approximate theory of the mechanism of rubber milling has been published in the Soviet Russian periodical, *Rubber and Resins*. The theory of milling rubber has been based on the assumption that the material behaves as a plastic substance with definite limits of flow, analogous to metals. This leads to the conclusion that roll thrust force is a square function of the rotational velocity, which contradicts experimental findings where the roll thrust forces are, in fact, proportional to the square root of angular velocity. The material does not exhibit Newtonian viscosity and the dependence of its rheological proportion on the velocity gradient of flow must be accounted for. The relationship between torque and rotational speed is non-linear.

The authors develop equations, starting from the Harvey-Stokes equation, modified for an average velocity gradient. These equations give the instantaneous velocities V_x and V_y of the mass of milled material at any point within the mass above and through the roll gap. (The material is assumed to adhere to roll surface in the region considered). Representative roll conditions are assumed and velocity profiles are drawn for several sections, the velocities being derived from these formulae. The maximum velocity of the materials is seven to nine times the peripheral velocity of the rolls. Above the gap, the bulk of the material exhibits counterflow.

Equations are developed, also, for pressure on the rolls over the arc of contact, and a pressure profile is drawn, similarly, from these equations. From this, the shear forces opposing rotation can be calculated and a figure obtained for total torque. The necessary rheological constants for construction of these velocity and pressure profiles were obtained by measurement of roll thrust forces on an actual set of rolls with a given rubber mix and inserting the actual values into the pressure equation to deduce these constants.

According to the authors, these results show that the rheological constants are independent of roll gap and confirm the square root relationship of spreading forces, to angular velocity of the rolls. Further confirmation of the velocity profiles was obtained by constructing open model sections of rolls and using a two-color, layered mix to indicate the flow of the material.

• A quantity of Cobalt 60, having an intensity of 1000 curies, is used in the radio-chemical laboratory of the well known German factory, Farbwerke Hoechst, AG, Frankfurt/Main.

• A Dutch firm, Die Algemene Kunstzijde Unie N. V., is considering the installation of facilities to manufacture synthetic rubber at its factory at Kleefse Waard. Production methods will be based on patents of the American firm, B. F. Goodrich Chemical Co. The organization plans to begin production during the summer of 1959. Initial production will be in foam rubber and special kinds of rubbers to be used to reinforce textile fabrics. This Dutch factory will be the first European manufacturing plant to use Goodrich Chemical patents.

• Contracts between German unions and the German rubber industry expired on January 31 and it was feared that a strike would start. However, it was possible to avoid work stoppage and a new contract has been signed. The present 45 hour week will be changed starting April 1, 1959, to 44 hours and will be decreased on July 1, 1960, to 43 hours. Wages will be increased by 2½ per cent starting April 1, 1959 and an additional increase of 2½ per cent will be granted on July 1, 1960. The new contract will expire in three years. It is significant that for the first time, no additional increases in actual wages have been granted.

The agreement covers only the states of Lower Saxony and Hessen. In Hamburg ,about 12,000 workers are still without a contract and it is possible that there will be a strike. However, as new contracts have been signed for the above districts, it is believed that a strike in Hamburg will be avoided.

• Figures on Italy's rubber consumption, expressed in metric tons, have been published by the Secretariat of the International Rubber Study Group and relate to the first three quarters of 1958. During this period, 35,157 tons of natural rubber, 15,498 tons of synthetic rubber and 5,067 tons of reclaimed rubber were consumed.

The natural rubber included 6,629 tons of latex; 18,133 tons of smoked sheets; 286 tons of sole crepe; and 10,109 tons of other grades. Of the total amount, 20,636 tons were used for tires and tubes; 11,117 tons for technical and other articles; 1,379 tons for footwear; 935 tons for soles, heels and sheeting; and 1,090 tons for cables.

The synthetic rubber consumed consisted of 636 tons of synthetic latices; 10,635 tons of dry S-type rubber; 1,336 tons of neoprene; 2,261 tons of butyl; and 630 tons of N-type rubber. Tires and tubes accounted for 11,178 tons of this total, while technical and other articles took 2,689 tons.

through Cabot's cost-cutting "mixed shipment" plan!

CABOT

Cabot's cost-cutting "mixed shipment" plan brings double-barreled savings within reach of virtually every carbon black buyer by permitting him to make his purchases the most economical way possible — in mixed carloads or truckloads.

Thus, the buyer saves twice — by paying economical carload prices and lowest possible freight rates.

Find out how you can take advantage of carload savings every time you order carbon black. Remember — Cabot makes more different grades of carbon black than anyone in the world. For this reason, we can offer the maximum number of money-saving combinations from which to choose. Your Cabot representative can work out a plan tailored to your requirements — help you maintain better inventory control and keep your costs at an absolute minimum.

Call him today.

GODFREY L. CABOT, INC.

77 FRANKLIN STREET, BOSTON 10, MASSACHUSETTS

LINERETTE

for faster Separation on Making Lines

Separation of stock and Linerette paper on the making lines is an easy, efficient operation. Linerette, a specially processed separating paper, prevents adhesion, insures faster operation on the making lines.

And Linerette features are important in other phases of processing, too. Frictioned stocks may be fed from the calender right into Linerette. It leaves no objectionable cloth marks and contains no oil or wax. When used in die-cutting operations, clippings may be worked away with regular scrap.

Linerette supplies additional savings when used in shipping lightweight stocks—there is no need to return a fabric liner. Where cleanliness is a vital factor, Linerette serves as a low cost lining for trays and containers.

GET THE FULL STORY ON CLIMCO PROCESSING

Illustrated booklet tells about Climco Liners and Linerette separating paper. Tells how to get better service from liners. Write for your copy now.

Linerette is supplied in any width up to and including 54″, in rolls of 9″, 11½″, 13″, and 15″ diameters; put up on 3″ i.d. cores. The yield is approximately six square yards to the pound. A 9″ roll contains 375 linear yards and a 15″ diameter about 1150 linear yards.

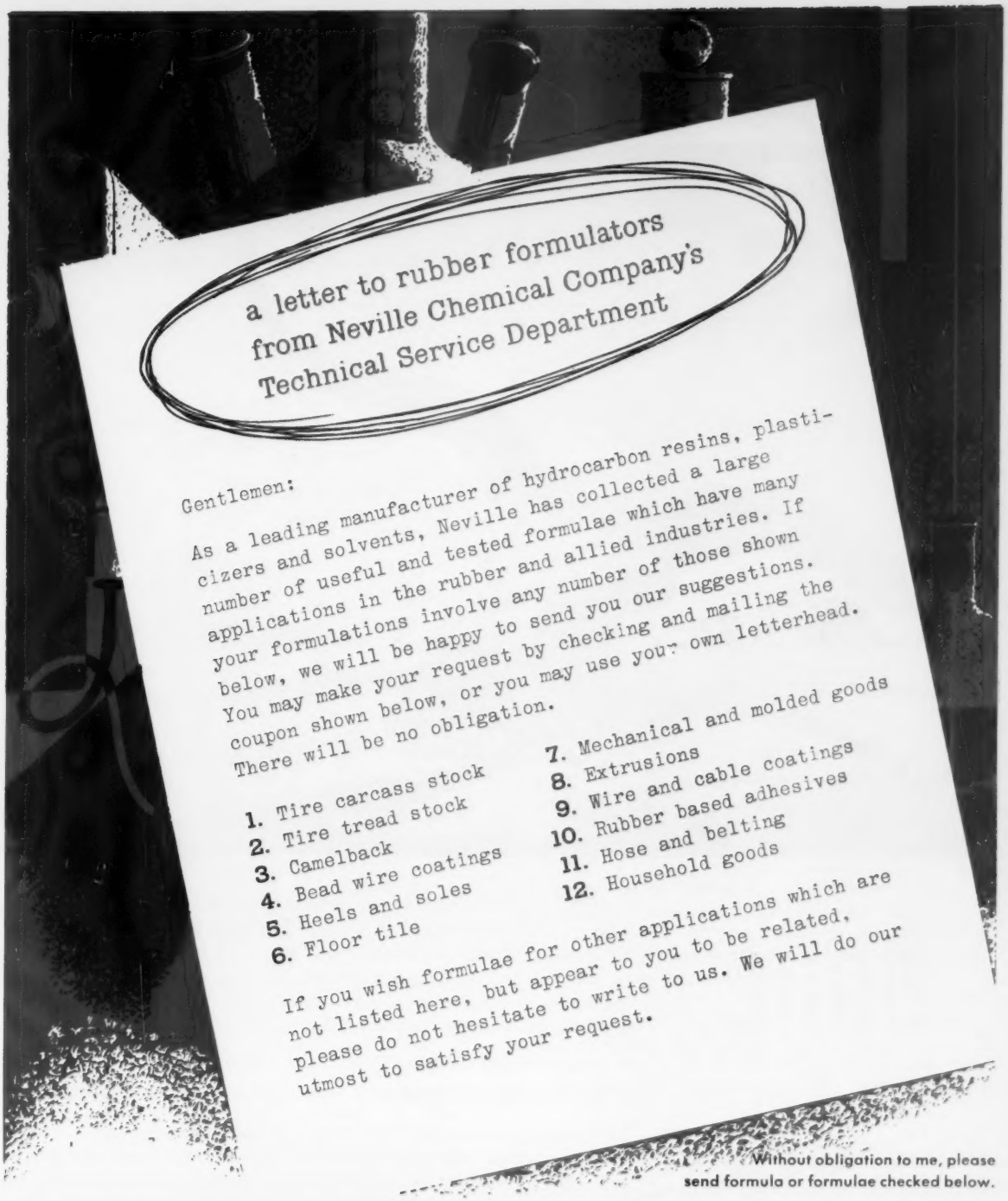
SAMPLES SENT ON REQUEST—*simply specify width desired.*

THE CLEVELAND LINER & MFG. CO.
5508 Maurice Ave. • Cleveland 27, Ohio, U.S.A.
Cable Address: "BLUELINER"

CLIMCO

LINERETTE
INTERLEAVING PAPER

MADE BY THE MANUFACTURERS OF CLIMCO PROCESSED LINERS



a letter to rubber formulators from Neville Chemical Company's Technical Service Department

Gentlemen:

As a leading manufacturer of hydrocarbon resins, plasticizers and solvents, Neville has collected a large number of useful and tested formulae which have many applications in the rubber and allied industries. If your formulations involve any number of those shown below, we will be happy to send you our suggestions. You may make your request by checking and mailing the coupon shown below, or you may use your own letterhead. There will be no obligation.

1. Tire carcass stock
2. Tire tread stock
3. Camelback
4. Bead wire coatings
5. Heels and soles
6. Floor tile
7. Mechanical and molded goods
8. Extrusions
9. Wire and cable coatings
10. Rubber based adhesives
11. Hose and belting
12. Household goods

If you wish formulae for other applications which are not listed here, but appear to you to be related, please do not hesitate to write to us. We will do our utmost to satisfy your request.

NEVILLE®

Without obligation to me, please send formula or formulae checked below.

Neville Chemical Company • Pittsburgh 25, Pa.

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12.

Please send necessary sample or samples of Neville products necessary for experimentation. _____

Name _____ Title _____

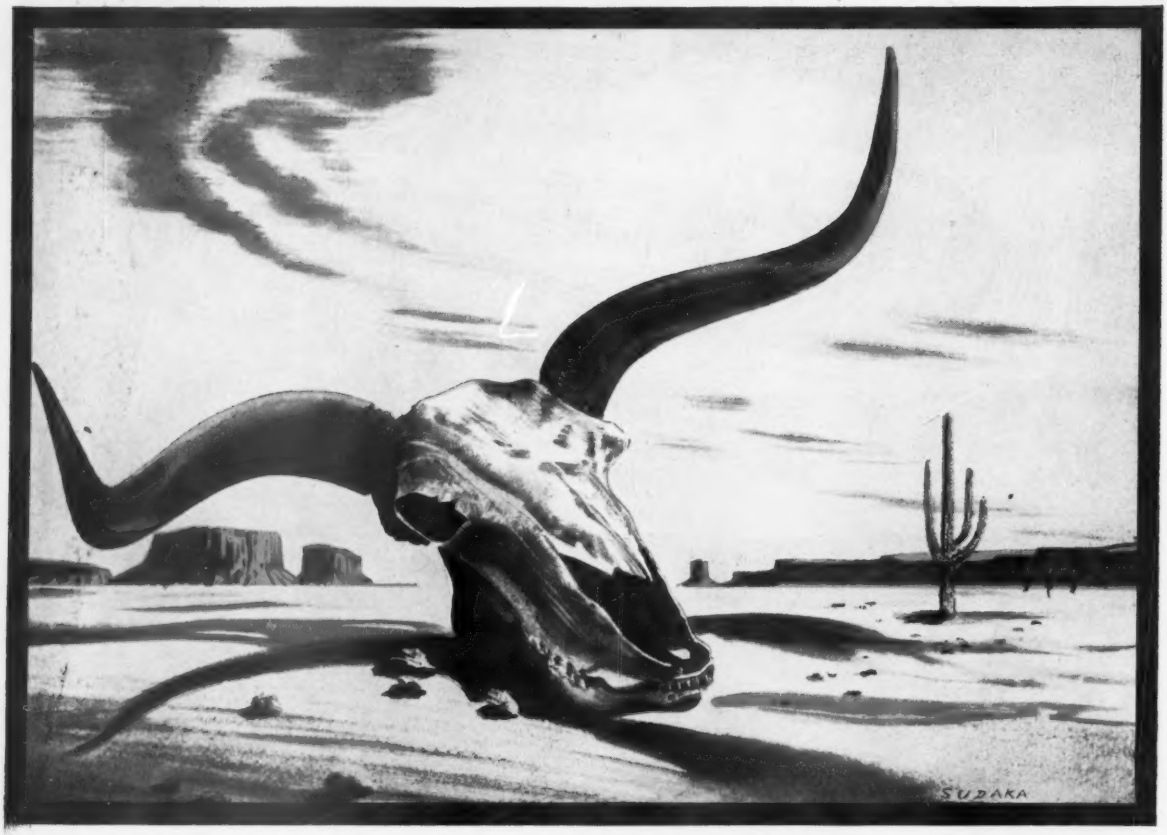
Company _____

Address _____

NC-34-RA

Naugatuck NAUGAPOL

specially processed R-S rubber



bone dry ...always!

A BONE parching on the desert couldn't hold much less moisture than a rubber product made of NAUGAPOL®. All 6 "hot" types (1016, 1018, 1019, 1021, 1022 and 1023) and both "cold" types (1503 and 1504) of Naugapol are *specially processed for low moisture absorption* by eliminating salt as a coagulant following polymerization. Extra straining and milling further help to produce salt-free elastomers characterized by:

- **LOW MOISTURE ABSORPTION**
- **HIGH DIELECTRIC PROPERTIES**
- **CLEANLINESS & UNIFORMITY**
- **EASE OF PROCESSING**

That's why NAUGAPOL butadiene-styrene polymers are so strongly preferred by manufacturers of rubber-insulated wire and cable, mechanical rubber goods and other rubber products requiring high electrical insulating qualities and excellent mechanical characteristics over a wide temperature range. Many grades of NAUGAPOL are non-discoloring, Polygard®-stabilized polymers suitable for the finest transparent, white or color-pigmented products.

See us at A.C.S. Rubber Division Meeting, Los Angeles, May 13, 14, 15.

Naugatuck Chemical

Division of United States Rubber Company 411N Elm Street Naugatuck, Connecticut

US RUBBER

Rubber Chemicals · Synthetic Rubber · Plastics · Agricultural Chemicals · Reclaimed Rubber · Latices · CANADA: Naugatuck Chemicals Division, Dominion Rubber Co., Ltd., Elmira, Ontario · CABLE: Rubexport, N.Y.

RUBBER AGE/Vol. 85, No. 1/April, 1959

Liquid Urethane Elastomers

Potential production economies and excellent physical properties forecast an important role for liquid urethane polymers

By R. J. ATHEY

Elastomer Chemicals Dept.,
E. I. du Pont de Nemours & Co., Inc.
Wilmington, Delaware

POLYURETHANE elastomer vulcanizates have demonstrated a unique combination of abrasion resistance, resilience, and tensile strength not available in conventional elastomers. In addition to the solid urethane polymers, the superior properties of urethane elastomers may be obtained in polymers which are processable in the liquid phase. The use of liquid polymers offers a means of making high-quality rubber goods by potentially low-cost processing methods. It is obvious that such a system lends itself to automatic and continuous processing using equipment relatively low in cost compared to conventional rubber processing machinery. A liquid polymer is processed by thoroughly mixing with a melted or liquid curing agent, followed by casting or pressure molding, spreading or spraying to form the desired product.

A fluid polymer which produces the outstanding vulcanizate properties of polyurethane elastomers has been prepared from polytetramethylene ether glycol and toluene diisocyanate. It will be used in this discussion to illustrate the properties that can be obtained from liquid urethane elastomers. This product, called Adiprene L (E. I. du Pont de Nemours), is a linear, isocyanate terminated polymer containing approximately 4% reactive isocyanate. It is stable in the absence of moisture, pale yellow in color, and has the consistency of honey. The physical and chemical properties of this polymer are described in Table I.

The vulcanization of a liquid polymer poses problems not encountered in a conventional elastomer. Materials such as styrene rubber or natural rubber are composed of long, chain-like molecules having an average molecular weight of 300,000 and higher. They are vulcanized by the introduction of cross-links. A liquid polymer is composed of relatively small molecules which must be linked together to form the high molecular weight structures necessary for toughness and good mechanical properties in the cured product. This process is called chain extension. The difference in structure between a conventional elastomer and a liquid urethane elastomer as it relates to vulcanization is shown schematically in Figure 1.

In addition, these large molecules must be cross-linked to develop elastic properties. Varying the ratio of cross-linking to chain extension will alter the properties of the vulcanizate over a wide range. As the proportion of cross-linking is increased, vulcanizate properties such as resilience and resistance to compression set improve. As the proportion of cross-linking is decreased, properties such as tear strength, flex life and tensile strength are improved. Chain extension and cross-linking of Adiprene L are controlled by the time and temperature of curing and by the type and amount of curing agent used. These reactions occur simultaneously in a single processing step.

Adiprene L may be transformed from a liquid to a solid elastomer by reaction of the terminal iso-

TABLE I—COMPOSITION AND PHYSICAL PROPERTIES OF ADIPRENE L

Composition	Isocyanate terminated polymer
Isocyanate Content	4.0 — 4.3%
Molecular Weight (Avg.)	Approximately 2000
Viscosity, 84°F.	16,000 — 19,000 cps.
Viscosity, 212°F.	600 — 800 cps.
Specific Gravity	1.07
Raw Polymer Storage Stability @ R.T.	Excellent, in absence of moisture
Volatile Material	Nil
Solubility	Ketones, esters, aromatic hydrocarbons

Note: This paper was presented before the Division of Rubber Chemistry, ACS, Cincinnati, Ohio, May 14, 1958.

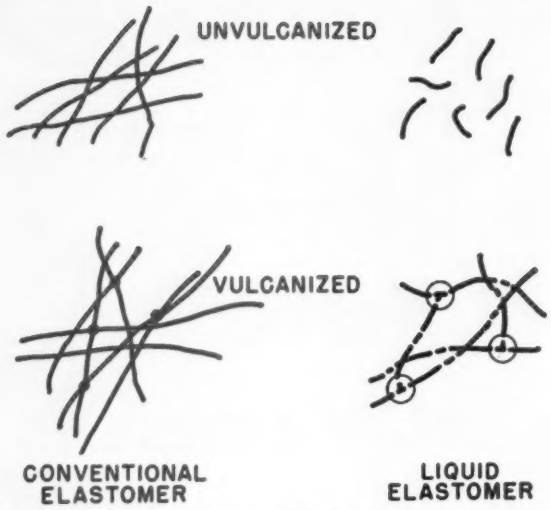


FIG. 1—Vulcanization of conventional elastomer and liquid elastomer.

cyanates on the polymer with virtually any material which contains two or more active hydrogens. Diamines and polyhydroxy compounds provide the best over-all vulcanizate properties for most applications. Typical reactions involved in the curing of Adiprene L, and their relative rates, are:

(A) Urethane formation — Moderate

$$ROH + R'NCO \rightarrow ROC(=O)-N(H)-R'$$

(B) Urea formation — Fast

$$RNH_2 + R'NCO \rightarrow RN(H)-C(=O)-N(H)-R'$$

(C) Biuret formation — Slow

$$RN(H)-C(=O)-N(H)-R + R'NCO \rightarrow RN(H)-C(=O)-N(C(=O)NHR')-R$$

(D) Reaction with water — Slow

$$RNCO + H_2O \rightarrow RNHCOOH \rightarrow RNH_2 + CO_2.$$

$$RNH + RNCO \rightarrow RN(H)-C(=O)-NR.$$

A urethane is formed when an isocyanate and an alcohol react according to reaction (A). When a diisocyanate such as Adiprene L is treated with an equivalent amount of a glycol, a high molecular weight urethane polymer is formed. Similarly, a substituted polyurea is formed when a diisocyanate and a diamine react (B). These substituted ureas react with isocyanates to form substituted biuret as shown in (C). Isocyanates react with moisture absorbed from the atmosphere and form ureas as shown in reaction (D). Glycol and diamine curing agents become a structural part of the polymer during curing.

TABLE II—CURING SYSTEMS FOR ADIPRENE L

	Diamine	Polyol	Moisture***
Pot Life*, min.	1–20	60–4800	**
Cure Time, 212°F., hours	1–3	6–24	125–150
Tensile Strength, psi	>4500	2000–2500	>4500
Hardness, Shore A	88–92	55–60	85

*Time required for the polymer to become too viscous to pour, measured from the addition of the curing agent; **Indefinite in the absence of moisture; ***Exposed to air at 75°F., 50% relative humidity.

Curing Agents

The type of material used to cure Adiprene L is an important factor in controlling its vulcanizate properties. The essential differences between the three main classes of curing agents are shown in Table II.

Aliphatic diamines react almost instantaneously and are impractical to process. Aromatic diamines react rapidly and yield tough, tear resistant vulcanizates. Glycols react slowly and yield soft stocks which are moderately strong and tough. The properties of moisture cured vulcanizates resemble those of diamine cures, since ureas are formed in both cases.

Experience has shown that Adiprene L cured with aromatic diamines has the most desirable set of properties for general use. Most aromatic diamines, however, react too rapidly for convenient handling. Introduction of chlorine groups into the positions ortho to the amino groups is an effective way of reducing the reactivity of the amino groups. 4,4′-Methylene-bis-(2-chloroaniline) is an excellent curing agent for Adiprene L. It reacts more slowly than most diamines and provides a good balance between pot life and cure time, and yields excellent physical properties. The

TABLE III—EFFECT OF MOCA CONCENTRATION

Formula				
	Parts			
Adiprene L	100			
Moca	As shown			
Mixed at 212°F., cured 3 hours at 212°F.				
Moca, phr	6	9	11	13
Modulus @ 100%, psi	800	1000	1000	1000
Tensile Strength, psi	3500	4000	5000	4200
Elongation @ Break, %	350	350	440	480
Hardness, Shore A	86	89	90	88
Compression Set, ASTM B, % 22 hr. @ 158°F.	20	20	26	37
Split Tear, ASTM D-470, pli	22	35	50	75
Graves Tear, pli	450	490	500	490
DeMattia Flex, hr. to break, unnotched	.25	.25	.25	100+

TABLE IV—EFFECT OF DIOL/TRIOL RATIO

Adiprene L	100.0	100.00	100.0
1,4-Butanediol	3.5	2.25	...
Trimethylol propane	1.0	2.25	4.5
Cure, hr./°F.	6/285	6/285	6/285
300% Modulus, psi	400	600	1000
Tensile Strength, psi	2500	1850	1100
Elongation, %	620	440	310
Hardness, Shore A	58	60	61
Comp. Set, ASTM B, % (22 hr./158°F.)	7	3	2

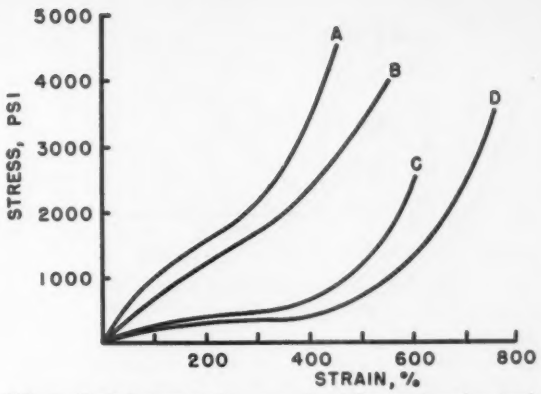
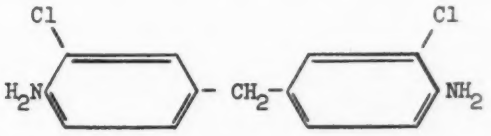


FIG. 2—Typical stress-strain curves for Adiprene L and natural rubber vulcanizates.
(A=Adiprene L/Moca; B=Natural rubber tread; C=Adiprene L/Polyol; D=Natural rubber gum.)

chemical structure of this curing agent, which has the trade name of Moca (Elastomer Chemicals Department, E. I. du Pont de Nemours & Co., Inc.), is



Its properties are: Melting point, 212° to 220° F.; molecular weight, 267, and specific gravity, 1.39.

The urea groups formed by a diamine cure exhibit strong interchain attraction. This attraction functions as cross-linking which reinforces the polymer and aids in developing high strength.

Chemical cross-linking and branching are introduced through the biuret reaction (C). The degree of biuret cross-linking is controlled by the curing temperature and by the amount of Moca used. When sufficient Moca is added to Adiprene L to react with all the isocyanate groups in the polymer, a high molecular weight chain extended polymer is obtained. When a slight deficiency of Moca is used, a small amount of terminal isocyanate remains in the polymer, which can react with the urea linkages developed in the polymer to form biuret branching. About thirteen parts of Moca are required to react with all of the isocyanate present in the polymer. The influence of Moca content on vulcanizate properties is shown in Table III.

Specific vulcanizate properties may be altered by changing the Moca content. As the Moca content is lowered, an increase in cross-linking is indicated by reduced tensile and tear strength coupled with improvement in resistance to compression set. The best general purpose vulcanizates are obtained with 11 to 13 parts of Moca.

Polyol vulcanizates are softer and have less strength than diamine cures. The best vulcanizate properties are obtained with a combination of a dihydroxy chain extending agent and a trihydroxy cross-linking agent. A mixture of butanediol and trimethylol propane or castor oil has proven satisfactory for many applications. Vulcanizate properties can be altered by variation in the ratio of diol to triol. This effect is illustrated in Table IV using a butanediol/trimethylol propane system.

Diols have not yielded a satisfactory state of cure when used alone, since they produce only chain extension of the polymer. A triol must be used to develop elastic properties. The degree of cross-linking is raised as the proportion of triol is increased. This produces an effect similar to that observed when the Moca level is decreased.

TABLE V—BASIC ADIPRENE L FORMULATIONS

	Diamine	Polyol
Adiprene L	100	100.0
Moca	11	—
1,4-Butanediol	—	3.5
Trimethylol propane	—	1.0
Mixing temperature, °F.	212	212
Cure, hr./°F.	3/212	6/285

Effect of Cure on Vulcanizate Properties

Various curing systems may be used to produce a wide range of vulcanizate properties. Experience has shown that diamine curing systems or a mixture of butanediol and trimethylol propane provide a good balance of properties. A typical formulation for each curing system is shown in Table V. These two stocks will be used to illustrate the properties of Adiprene L.

Typical stress-strain curves for Moca and polyol vulcanizates are shown in Figure 2. Curves for a natural rubber gum stock and tire tread stock are also shown. The high modulus values shown by the Moca vulcanizate are the result of the reinforcement by the urea groups, which appears to be stronger than the conventional reinforcement observed in the tread stock. The polyol vulcanizate resembles that of a natural rubber gum stock and indicates a lower degree of inter-chain attraction than exists in a Moca cure.

Diamine vulcanizates exhibit a unique combination of high hardness, high resilience, good tear strength

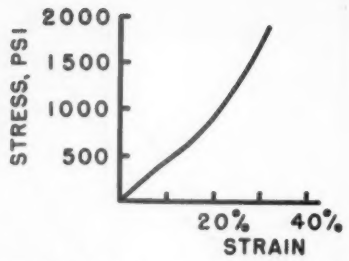


FIG. 3—Typical compression/deflection curve for Adiprene L/Moca vulcanizate.

and resistance to deformation under load. Adiprene L cured with polyols exhibits excellent resilience and abrasion resistance, but is not as tough and hard as when given a Moca cure. Several of the more important mechanical properties are shown in Table VI.

The Bureau of Standards Abrasion Index of 150% is unusually high for a material of such hardness. A conventional elastomer, loaded to a similar hardness, generally exhibits a lower abrasion index and lower resilience. Adiprene L stocks stiffen with decreasing temperature, but are not brittle at temperatures as low as —80° F. Long-term storage at +14° F. and —40° F. shows no evidence of crystallization.

The hard resilient stocks developed by diamine curing agents are very resistant to deformation under load. The internal reinforcement of the urea groups formed in the polymer is responsible for the high load-bearing capacity of these compositions. A typical compression/deflection curve for Adiprene L/Moca vulcanizates is shown in Figure 3. The hardness and load-bearing capacity of these vulcanizates are retained at elevated temperatures. The influence of test temperature on tensile strength, modulus, deflection under load, and hardness is shown in Table VII.

Hardness, 100% modulus, and deflection under load are practically unaffected when tested at temperatures up to 212° F. Significant loss in these properties is evident at 250° F. Tensile strength is reduced progressively as the test temperature is increased. However, this is a reversible effect, not related to aging. This combination of properties suggests that

TABLE VI—MECHANICAL PROPERTIES OF CURED ADIPRENE L

	Diamine	Polyol
Hardness, Shore A	88–92	55–60
Yerzley Resilience, %	70–75	75
Abrasion Resistance		
Bureau of Standards Index, %	150	
Taber*, Wt. loss, g/rev.	2×10^{-5}	2×10^{-5}
Torsional Stiffness, psi		
R.T.	1400	100
—40°F.	11,000	650
—60°F.	24,400	21,500
Brittle Point	<–80°F.	<–80°F.

*H-18 wheels; 500 g weights.

TABLE VII—PROPERTIES OF CURED ADIPRENE L MEASURED AT HIGH TEMPERATURES

Temperature °F.	Hardness, Shore A	Compression Set, ASTM A, 22 hours at 400 psi % Deflection	Compression Set, ASTM A, 22 hours at 400 psi % Set	100% Modulus, psi	Tensile Strength, psi
R.T.	92	9.0	0.6	1000	4500
158	92	9.5	1.6	1000	1950
212	92	9.5	3.7	975	1200
250	91	19.0	19.0	850	950

Adiprene L vulcanizates might be used to advantage in pump impellers, solid tires, bushings, diaphragms and other applications where toughness and abrasion resistance are important.

Heat, Ozone and Oxygen Resistance

Adiprene L/Moca vulcanizates show excellent resistance to heat, ozone and oxygen. This might be expected since there is no unsaturation in the polymer chain. Exposure to 100 ppm ozone for over 48 hours resulted in only slight cracking which did not grow during prolonged exposure. Oxygen bomb aging under standard conditions (300 psi, 158° F.) resulted in only slight decrease in tensile strength after 28 days.

Diamine cured stocks are resistant to heat aging at 212° F. Reduction of properties results from exposure to heat at 250° F. as shown in Figure 4. There are similar small losses in other properties. The influence of heat on mechanical properties (Table VII) and the effect of heat aging indicate that Adiprene L vulcanizates will be serviceable at temperatures up to 200° F.

The resistance to oils and solvents which Adiprene L stocks show is comparable to that of conventional oil-resistant elastomers. The effect of several oils and fuels is shown in Table VIII. The low values shown in most cases indicate that Adiprene L should find usage in the automotive and industrial machinery fields where the combination of hardness, resilience and oil resistance are of value.

Adiprene L vulcanizates retain properties well in room temperature or warm water, but suffer some deterioration in boiling water. Hot water causes a sufficient amount of degradation that formulations should be tested before being placed in this type of service. Polyol cures, in general, show better water resistance than Moca cures.

The best properties of Adiprene L are developed without the use of reinforcing fillers or plasticizers. Carbon blacks, fillers and plasticizers may be added for the improvement of specific properties or cost reduction, but at the expense of the general level of physical properties.

The addition of dry fillers stiffens the polymer considerably. When fluid processing of filled polymers is desired, a compatible plasticizer should be used as a carrier for the filler. The thermal blacks are useful for compounding since they stiffen the mix less than the reinforcing blacks and more can be used.

Most of the conventional rubber plasticizers are incompatible with Adiprene L. Ester plasticizers, such

TABLE VIII—OIL AND FUEL RESISTANCE OF MOCA VULCANIZATES

Volume Swell, %
3 Days Immersion

	Adiprene L/Moca	Test Temp., °F.
ASTM #1 Oil	0	212
ASTM #3 Oil	30	212
ASTM Reference Fuel B	35	75
JP-4 Fuel	26	75
Esso Transmission Oil	8	75
21-B Brake Fluid	120	75

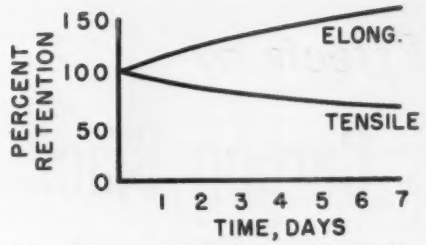


FIG. 4—Effect of heat aging at 250°F. on diamine cured stock.

as trioctyl phosphate, dioctyl phthalate, and tri-(chloroethyl)phosphate are most useful. Dixylyl disulfide is useful since it reduces the physical properties less than the esters.

Compounding Procedure

A procedure for mixing Adiprene L compounds which has proven satisfactory consists of heating the polymer to 158° to 212° F., adding melted Moca and mixing well. The mix is degassed under vacuum and poured carefully into the mold. A heating period of three hours at 212° F. is necessary to complete the cure. Since the reactions of isocyanates are temperature sensitive, close control of times and temperatures of processing and curing is necessary for good reproducibility.

When dry fillers are to be used, they should be dispersed on a three-roll mill, since it is almost impossible to handle liquids on conventional rubber mills. The pigments should be as dry as possible and a drying period of 12 hours at 285° F. is suggested. Processing methods for continuous automatic mixing and dispensing of liquid polymers are currently being developed.

Liquid urethane polymers are expected to assume an important role in the rubber industry because of the high order of vulcanizate properties obtained and the potential production economies possible through liquid processing. The combination of high hardness, tear strength, resilience and abrasion resistance obtained with liquid polymers such as Adiprene L offers performance characteristics not available in conventional elastomers.

Coming Next Month...

Effects of Gamma Radiation on Compression Set of Rubbers—By R. E. Morris, R. R. James and F. Caggegi, Rubber Laboratory, Mare Island Naval Shipyard, Vallejo, Calif.

A study which reveals how different elastomers react to various dosages of radiation.

Laboratory Processing Properties of Two Synthetic Polymers—By K. C. Beach, L. F. Comper and V. E. Lowrey, Goodyear Tire & Rubber Co., Akron, Ohio.

Power consumption curves for butadiene-styrene and butadiene-acrylonitrile rubbers provide important processing data which have both research and commercial value.

Automated Tire Curing Plant.

A picture story on how a tire is produced in the world's largest and most fully automated curing plant.

Rubber versus Plastics in the Footwear and Flooring Tile Industries: A Panel Debate.

A debate on the relative merits of rubber versus plastics in two important industrial fields as presented before the Quebec Rubber and Plastics Group, plus the questions and answers which followed.

PLUS R/A SPECIAL INDUSTRY REPORT

Supervisors' Problems.

Information derived from a survey which reports the first-hand reactions from plant supervisors on what they think to be their most pressing problems for the year ahead.

Effects of

Carbon Black

on rubbers for low temperature use

A study of the effect of carbon black type and loading on the temperature-retraction properties of five polymers

By FRED W. BARLOW and ROBERT W. CRETNEY
Thermatomic Carbon Company, Sterlington, Louisiana

A COMMON problem for the rubber technologist is compounding for low-temperature service. There are several methods of retaining rubber-like properties at low temperatures—proper choice and amount of plasticizer, careful selection of elastomers, etc.—many of which have been extensively studied. Less attention has been paid to the effect of carbon black type and loading. It was to provide further information on this subject this study was made.

Numerous test methods for evaluating low-temperature properties, such as cold compression set and brittleness temperature by impact, have been developed. Many of these tests give a limited amount of information on the utility of the compound. As a single test giving information over a broad temperature range, and with valuable correlations to other properties, we selected the retraction test developed by Smith, Hermonat, Haxo and Meyer *(1)*.

Using test elongations of 250%, the latter found that the test gave "a temperature index correlating with the stiffness of elastomer vulcanizates after storage at low temperatures and can be used to measure the merit for low temperature applications of both crytallizable and non-crystallizable elastomers." The authors found that the results could be correlated with cold compression set and hardness after low-temperature storage. The test has been used by other investigators: Sperberg and Svetlik *(2)* for example found that temperatures at which the samples retracted 50, 20, 10 and 1% corresponded respectively to the temperatures at which the torsion modulus had increased to 2, 5, 10 and 100 times the modulus at room temperature.

Essentially the test consists in stretching dumbbell-shaped specimens to a specified elongation, locking them in that position, chilling the samples in a bath, and then allowing them to retract. The bath is then heated, and the temperatures at which the samples have been retracted certain percentages of the original elongation are noted. Usually this is done at intervals of 10%, although other points may be observed. Results may be concisely expressed as TR 50 of

Table I—Formulas Used in T-R Testing

	Paracril BLT	Butyl Rubber 215	Neoprene GN-A	Smoked Sheet No. 1	Synpol 1500
Polymer	100.00	100.0	100.0	100.0	100.00
Zinc Oxide	5.00	5.0	2.5	5.0	5.00
Stearic Acid	1.00	1.0	0.5	3.0	2.00
Altax	1.50	1.0	—	0.7[1]	1.50
Methyl Tuads	0.15	—	—	—	—
Ethyl Tellurac	—	1.0	—	—	—
Cumate	—	—	—	—	0.15
Sufur	1.50	2.0	—	2.5[2]	2.00
Agerite Powder	—	—	2.0	1.0	1.00
L.C. Magnesium Oxide	—	—	4.0	—	—
Cumar P-25	5.00	—	—	—	—
Faxam 40 Oil	—	5.0	—	—	—
Bardol	—	—	5.0	—	—
Circo L.P. Oil	—	—	—	5.0	—
Circosol 2XH	—	—	—	—	4.00
Black (FT, MT, SRF, EPC, HAF)	25, 50, 75, 100 parts by weight per 100 of polymer				
Cures	60 min. @ 290°F.	30 min. @ 310°F.	30 min. @ 307°F.	40 min. @ 290°F.[3]	40 min. @ 302°F.[4]

(1) 1.0 parts for channel black; (2) 2.75 parts for channel black; (3) 60 min. for channel blacks; (4) 60 min. for 25 and 50 parts EPC.

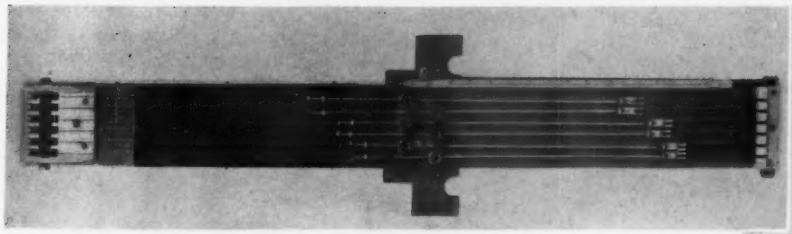


FIG. 1—The test rack (on its side), a part of the testing apparatus.

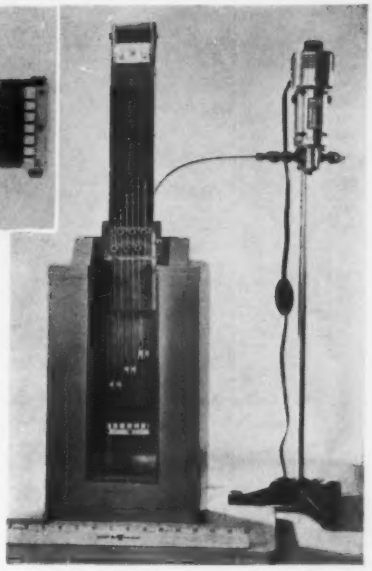


FIG. 2—Apparatus used in temperature-retraction tests.

—40°C., for example, where the number after the letters TR represents the percentage retraction of the original elongation.

The present study comprised the testing of five blacks in five elastomers at four loadings. The blacks were chosen as representative of the main types used and included medium thermal (Thermax), fine thermal (P-33), semi-reinforcing furnace (Pelletex), easy processing channel (Kosmobile 77), and high abrasion furnace (Philblack 0).

The polymers used were smoked sheet natural rubber, the styrene rubber Synpol 1500, Butyl Rubber 215, Neoprene GN-A and the butadiene-acrylonitrile type, Paracril BLT. Undoubtedly some of these synthetic rubber types are not those recommended for low-temperature service, but it was desired to test the most commonly used grade of each polymer. The loadings were 25, 50, 75 and 100 parts by weight. The compounds and cures used are given in Table I.

The compounds are essentially tread-type compounds. The softener-plasticizer content was held low to diminish their known effect on the low-temperature properties of the compounds.

Procedure

The apparatus and testing method used was essentially that described in ASTM Method D-1329-54(T) *(3)*. Figure 1 illustrates the test rack used, and Figure 2 the complete apparatus. An unsilvered, evacuated Dewar flask (3½ inches I.D., 12 inches long) was supported and insulated by the wooden box shown. The testing rack was made from Micarta. Bicycle spokes were used in place of the connecting wire specified to reduce any twisting of the samples. The cooling bath was methanol, capable of being heated by a 250-watt bayonet-type heater connected to a variable resistor and the laboartory 110 V. supply line. The bath was provided with a variable speed stirrer and a thermometer (—100° to +50°C.) was attached to the testing rack, parallel to the axis of the samples.

Test pieces were dumbbells died out with a 2-inch T-50 die with ¼-inch tab ends from tensile slabs. The methanol in the Dewar flask was chilled to —74°C. by adding powdered dry ice. The test rack was then removed and the dumbbells inserted in the clamps. Samples were stretched to the desired elongation and held by tightening the binding posts. After loading with the samples the test rack was returned to the flask, still at —74°C. After 10 minutes conditioning at this temperature, samples were allowed to retract by loosening the binding posts.

The temperature of the bath was then raised at the rate of 1°C. per minute. Temperatures at which various % retractions of the original elongation occurred were recorded but testing was stopped at 20°C. For 50% test elongation, temperature readings at 5%, each 10% up to 90%, and 95% retraction were taken. For all higher elongations, temperature for 2½% retraction was also recorded.

Results

At 50% elongation it was possible to obtain temperature-retraction curves for all compounds except the 100 part HAF loaded neoprene stock. All these polymers tend to give the same sigmoid curve. Typical curves are those for the 50 part loading of fine thermal black, depicted in Figure 3. Following the curves from left to right, there is a sharp rise in the TR value up to about TR 10. This represents the emergence of the compound from the glass-like or frozen state on heating, and is a second-order transition.

The freezing point has been defined as the intercept on the temperature axis of the body portion of the curve when the latter is extrapolated. The freezing point is largely determined by the polymer used, rather than the black, in these studies. From about the TR 10 point to the TR 70 simple temperature effects predominate and retraction proceeds at a relatively constant rate. By the TR 70 point stresses to continue the process are much weaker and there is a slow further retraction with the curve becoming asymptotic to the 100% retraction line. In general the lower the TR

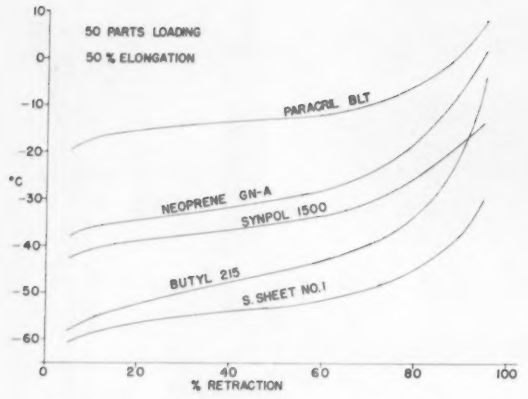


FIG. 3—Temperature-retraction with fine thermal black.

values the more serviceable will be the rubber compound at low temperatures. The curves show the relative resistance to low temperature of these particular polymers, smoked sheet offering the greatest and Paracril BLT the least to low-temperature stiffening.

Although the polymer is of major importance in determining the position of the TR curves, it is also influenced by the black and the loading employed. Higher TR values—indicating more sluggish stocks at low temperatures—are obtained with the finer particled blacks. This is illustrated in Figure 4. These results—for 50 part loadings in natural rubber—are typical of all polymers. The medium thermal black stocks resist stiffening the most, followed by fine thermal, semi-reinforcing furnace, high abrasion furnace and easy processing channel in that order.

The curve for fine thermal, not shown on Figure 4, lies between medium thermal and semi-reinforcing furnace but is so close to the latter clear reproduction would be difficult. It is probably not coincidental that the black order above is also the order of increasing

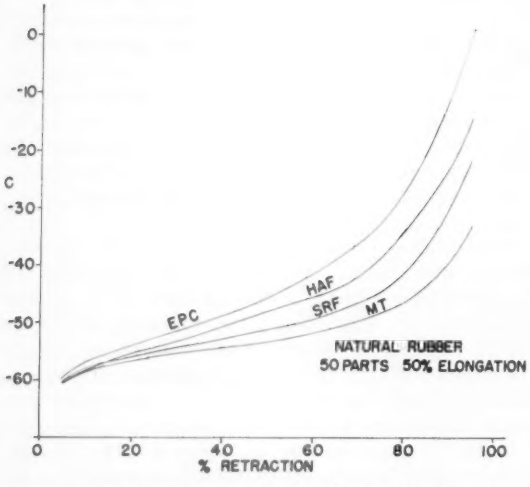


FIG. 4—Temperature-retraction of various blacks.

Table II—Influence of Black Type and Polymer on Rise of TR Values with Loading

(A) NEGLECTING EFFECT OF POLYMER, RISE IN °C.

Loading Range (Parts)	Black: Medium Thermal	Fine Thermal	Semi-Reinforcing Furnace	High Abrasion Furnace	Easy Processing Channel
25 to 50	0.9	1.6	1.7	4.9	5.0
25 to 100	3.5	5.9	7.6	14.6*	15.7

(B) NEGLECTING EFFECT OF BLACK TYPE, RISE IN °C.

	Paracril BLT	Synpol 1500	Butyl Rubber 215	Smoked Sheet No. 1	Neoprene GN-A
25 to 50	0.6	2.4	2.1	2.9	9.9
25 to 100	3.1	7.8	8.8	11.9	16.0*

* Four values averaged.

surface area and decreasing particle diameter. It must be remembered that these curves are for 50% test elongation. At higher elongations strong crystallization effects appear which will be discussed later.

Loading has a major influence on TR, with increased loading resulting in higher values. Figure 5 illustrates the effect of increasing the loading of high abrasion furnace black in Synpol 1500 from 25 to 100 parts. At the TR 10 point there is a difference of 2½ °C., by TR 70 the spread is 13½ °C. and by TR 90 it is 16°C. An increase in TR values with loading is characteristic of the behavior of all blacks in all the gums. Freezing points of these compounds have been determined by extrapolating the body portions of the curve to the temperature axis. The spread in freezing points so obtained is only 2°C.—little more than would be expected from experimental and extrapolation error.

The raising of TR values with increased black loading is dependent on the type of black and the polymer. Figure 6 illustrates the difference that may be expected in smoked sheet compounds with 25 and 100 part loadings of medium thermal and easy processing channel black. At the TR 10 point the spread between the medium thermal stocks is 2°C., between the easy processing channel 1½ °C. However, at the TR 70 level, while the range is only 5½ °C. for the first, it is 28°C. for the second. Table II gives the average values for the rise in TR values with loading by black type and by polymer. For this comparison, TR 50 values and a test elongation of 50% were arbitrarily chosen.

When the effect of polymer is neglected the increase in TR values with loading is least with medium thermal black, followed by fine thermal, semi-reinforcing furnace, high abrasion furnace and easy processing channel in that order. Fully as important as black type in raising the TR value with loading is the polymer used. Part (B) of Table II gives the order in which polymers raise the TR value. The least change is noted with Paracril BLT followed in order by Synpol, Butyl Rubber 215, smoked sheet and finally Neoprene GN-A. Probably even at the comparatively low elongation of 50% and the short immersion time crystallization is playing a part in this. Both Paracril

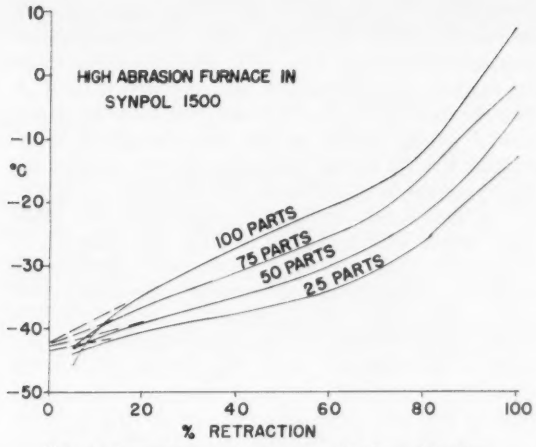


FIG. 5—Temperature-retraction as a function of loading.

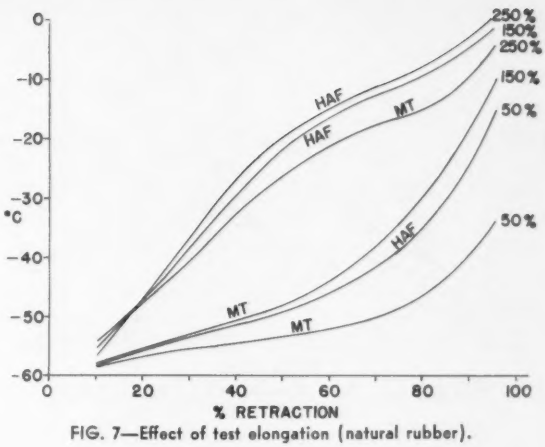


FIG. 7—Effect of test elongation (natural rubber).

BLT and Synpol 1500—considered non-crystallizable polymers—show the lowest increase, while Neoprene GN-A with the highest increase is most easily crystallized.

Effect of Increasing Test Elongation

As the test elongation is increased, more and more test pieces break in the clamps on extension, especially those made of the 100 part loaded stocks. By 300% extension, 40% of the compounds had broken and testing was not carried past this point. For most rubber goods conditions in service would not require elongations greater than 50% and the above relationships would apply.

With increasing elongation two phenomena affect the TR values. With crystallizable polymers TR values become higher as the gums crystallize and higher temperatures are required to break down that structure. With non-crystallizable elastomers increasing the test elongation tends to give lower TR values as the retractive force has been increased.

We might first consider the effect of increasing the extension on the crystallizable polymers—smoked sheet, butyl rubber and Neoprene GN-A. For smoked sheet, as the test elongation is increased the sigmoid curve of the 50% elongation becomes distorted. A bump appears about the —20°C. level, and until the temperature is raised above this point, the retraction is held down.

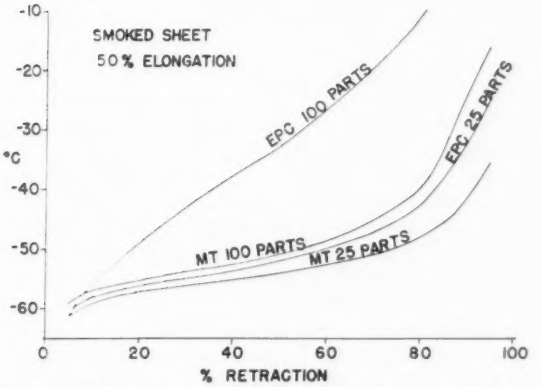


FIG. 6—Effect of loading and black on spread of temperature-retraction value.

This distortion is illustrated in Figure 7, which compares the TR curves at 50, 150, and 250% for 50 part loadings of medium thermal and high abrasion furnace black. With both blacks the curve reverses itself as the test elongation is increased from 50 to 250% and the bump due to crystallization is plainly evident. However, if the amount of distortion from the 50% curve can be taken as a measure of the amount of crystallization, it reveals that the medium thermal stock is less prone to crystallization than high abrasion furnace. By 150% the latter stock is largely crystallized, but first order transition has hardly started with the medium thermal compound. This tendency to crystallization has been traced through the loadings and blacks employed and found to vary with both.

If we consider the appearance of a bump in the TR curve as a definite sign of crystallization, no crystallization occurs at 50% elongation. By 100% test elongation easy processing channel and high abrasion furnace show it at 50 parts loading and higher, and semi-reinforcing furnace at 75 parts loading and higher. By 150% thermal blacks show crystallization at 75 parts and higher, all other blacks at 50 parts and higher. By 250% all blacks at all loadings show this phenomenon.

As the test elongation is increased the curves tend to take up the same position, the crystallization factor obliterating differences due to black or loading. It is realized of course that crystallization of natural rubber stocks is never complete and that we are observing gradations of a condition that perhaps exists through 30 to 70% of the rubber mass.

The Butyl Rubber 215 stocks exhibit much less crystallization evidence in their TR curves than those for smoked sheet. In fact for the thermal black stocks there is no evidence of crystallization up to the 300%

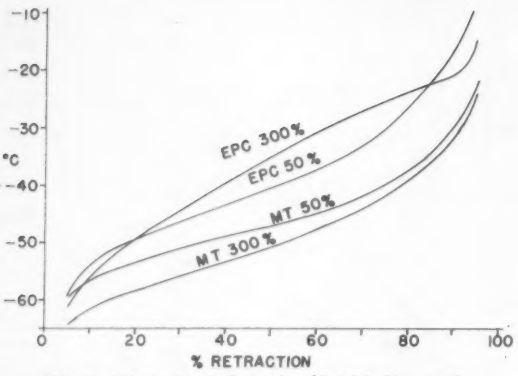


FIG. 8—Effect of test elongation (Butyl Rubber 215).

extension. This is inferred from the progressively lower TR curves as the test elongation goes up. There is some evidence of crystallization with the other three blacks if consistently higher TR values with higher test elongations can be taken as indicating crystallization. Using this criterion semi-reinforcing black compounds start to crystallize at approximately 200% elongation with 50 part loaded stocks; the 75 part loaded stocks begin at approximately 150%, and 100 part at 100% elongation.

Easy Processing Channel and High Abrasion Furnace

With easy processing channel and high abrasion furnace, crystallization appears earlier. For these blacks crystallization starts with the 25 part loading at 250% elongation, 50 part loading at 200% elongation, 75 part loading at 150%, and 100 part loading at 100%. Figure 8 illustrates the TR curves of medium thermal and easy processing channel stocks with a 50 part loading at 50 and 300% test elongations. Some distortion of the TR curves, similar to that observed in natural rubber stocks is noticed with the butyl rubber stocks, especially the 75 and 100 part easy processing channel stock at 200% elongation. Butyl rubber stocks crystallize only on extension. Probably more obvious crystallization effects would occur at higher test elongations than the 300% used here.

Results with the third crystallizable polymer—Neoprene GN-A—were somewhat confusing. There was some jerkiness in their retraction and some illogical reversals of the normal position of the TR curves for the different loadings occurred. For example, both the medium thermal and fine thermal blacks at a loading of 75 parts showed higher TR curves than 100 part loaded stocks at 250% elongation. However, from the over-all data, a number of general conclusions can be drawn.

Of the three crystallizable polymers Neoprene GN-A appears to show crystalline behavior most readily under these test conditions. Even at the low elongation of 50% all the blacks at 75 and 100 part loadings show the change in the curve that indicates this first order transition. Judged by the same criterion that was used with the natural rubber compounds, high abrasion furnace and easy processing channel crystallize most readily, followed by semi-reinforcing furnace, then the thermal blacks. Following the behavior of the natural rubber stocks as the test elongation is increased, the TR curves have a tendency to take up the same position, irrespective of type of black or loading.

The two non-crystallizable polymers in the series were Synpol 1500 and Paracril BLT. The behavior of the Synpol stocks was unexpected. Over the range 50 to 300% TR values did not become appreciably lower as test elongation was increased. A lowering of TR values would be logical as increased elongation should increase the retractive force. Figure 9 depicts the TR curves for 50 part loaded stocks using semi-reinforcing furnace and easy processing channel at 50 and 200% test elongation. With these blacks and loadings samples were not extensible to 300%. The difference between the two curves for each black is not considered significant.

The Paracril stocks did show a consistent lowering of TR values as test elongation increased. Comparing the blacks (except HAF) at a 50 part loading at 50% and 250% test elongation, lowering at the TR 10 point varied from 1 to 7°C., at TR 70 from 2 to 3°C. High abrasion furnace could not be included in this comparison as the 50 part loading stocks are not extensible to 250%. Figure 10 illustrates the TR curves for medium thermal and easy processing channel. Only the 50% elongation easy processing channel curve is shown; the 300% curve has a similar drop to that shown with fine thermal.

Summary

The temperature-retraction curves have been determined for five types of black in five polymers at four loadings. These TR curves were developed using test elongations from 50 to 300% in steps of 50%. At 50% test elongation all the compounds give sigmoid curves but at different positions relative to the temperature axis. A major influence on the position of the TR curve is the polymer used, with low-temperature flexi-

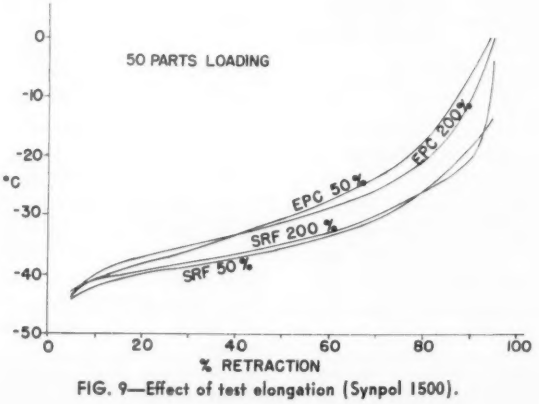


FIG. 9—Effect of test elongation (Synpol 1500).

bility depending upon such factors as the molecular weight, the choice of the main monomer, and the prevalence of polar groups.

Conclusions

Of the elastomers tested here, the best for low-temperature flexibility in rubber goods was smoked sheet, followed by Butyl Rubber 215, Synpol 1500, Neoprene GN-A and Paracril BLT. This conclusion is based on their behavior at 50% test elongation, which is a greater elongation than rubber compounds would be strained to in service. Current military specifications require that in general rubber parts must function at —67°F. (—55°C.) and withstand storage at —80°F. (—68°C.). Inasmuch as these samples were conditioned before testing at —74°C., the curves would give an indication of the suitability of the compounds tested for such service.

At low elongations, with equal loadings of black, the lowest TR values are given by the medium thermal black compound, followed by fine thermal, semi-reinforcing furnace, high abrasion furnace and, finally, easy processing channel. Lower TR values imply better low-temperature flexibility and retention of rubberlike properties at low-temperatures. The above ranking is true irrespective of polymer. It may be explained by the surface area and particle diameter characteristics of the black.

TR curves take the position and shape they do from the elastomer employed, the modulus of the stock (which would be related to the test elongation), the amount of crystallization, and the internal viscosity of the compounded vulcanized stock. In this case the test elongation of 50% is so low that crystallization is a minor factor and the modulus of the various stocks should not be widely different as they are under the same elongation when conditioned.

The internal viscosity of the stock is in all probability the major factor influencing the TR curve. The internal viscosity would depend on the fineness of the black employed. Since the loadings are equal, increasing fineness causes increased viscosity. In order of increasing fineness—judged by average particle diameter and surface area to allow for the differing particle size distribution—the blacks rank as follows: medium thermal, fine thermal, semi-reinforcing furnace, high abrasion furnace and easy processing channel. This would then be the order of increasing viscosity and increasing TR values.

For much the same reasons we should expect the TR values to increase with loading. Increasing the loading would increase the internal viscosity which would in turn result in high TR values. The differences in TR elevation caused by different blacks for the same increase in loading is a further result of the varying fineness. Increasing the black concentration from 25 parts to 100 parts results in a much more viscous stock if fine particled easy processing channel is used rather than coarse medium thermal. It is therefore not surprising that the ranking for the blacks is the same whether we are considering position of the

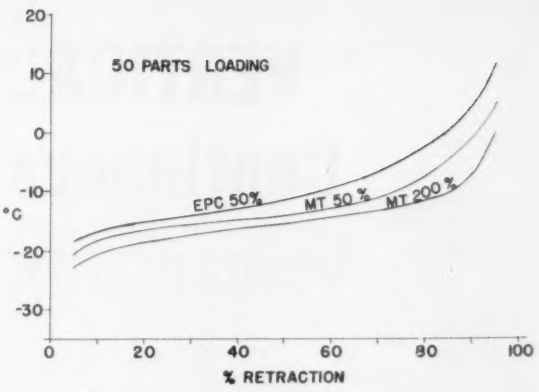


FIG. 10—Effect of test elongation (Paracril BLT).

TR values at similar loadings or the increase in TR values caused by the same increase in loading.

For the crystallizable polymers it was found that crystallization appeared earlier (i.e., at lower test elongations) with the more highly loaded stocks. It was also found that crystallization was induced most easily with the easy processing channel and high abrasion furnace stocks, followed by the semi-reinforcing black and finally the thermal blacks. For low-temperature service crystallization, of course, is a disadvantage. It would appear that the fineness of the blacks has an influence on the tendency of rubber stocks to crystallize, with fine particle blacks, like high abrasion furnace and easy processing channel, causing crystallization faster than coarse particle blacks, like medium thermal. It is theorized that at equal loadings the finer blacks produce more residual stress in the rubber which causes greater nucleation and consequent crystallization. In the same way higher loadings would be expected to induce more crystallization as there are more particles of black in the rubber, and the greater would be this residual stress.

From the data observed in this study good low-temperature properties are more easily obtained with thermal blacks than other types and the lower loading the better, irrespective of type. Naturally the properties desired at normal temperatures must be satisfactory as well. It might be that low-temperature flexibility built into a compound by the addition of special plasticizers could be more easily obtained by substitution of thermal black for reinforcing black.

LITERATURE REFERENCES

(1) Smith, Hermonat, Haxo and Meyer, "Retraction Test for Serviceability of Elastomers at Low Temperatures," *Anal. Chem.*, Vol. 23, No. 2, pp. 322-27 (1951).

(2) Svetlik and Sperberg, "The TR (Temperature-Retraction) Test for Characterizing the Low Temperature Behavior of Elastomeric Compositions," *Rubber World*, Vol. 124, p. 182 (1951).

(3) ASTM D-1329-54T, "Tentative Method of Test for Evaluating Low-Temperature Characteristics of Rubber and Rubber-Like Materials by a Temperature-Retraction Procedure (TR Test)," *ASTM Standards*, Part 6, p. 1191 (1955).

VERTICAL Continuous Vulcanizing

A new method

Much of the damage which was formerly inflicted on soft insulation before it was cured can now be eliminated

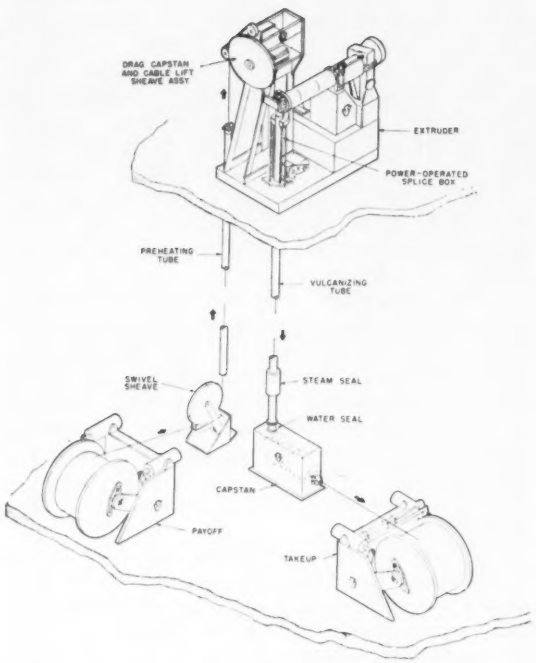


FIG. 1—Schematic diagram showing arrangement of machinery in vertical continuous vulcanizing process.

By BEN H. DAVIS
Davis-Standard Division, Franklin Research Corp., Mystic, Connecticut

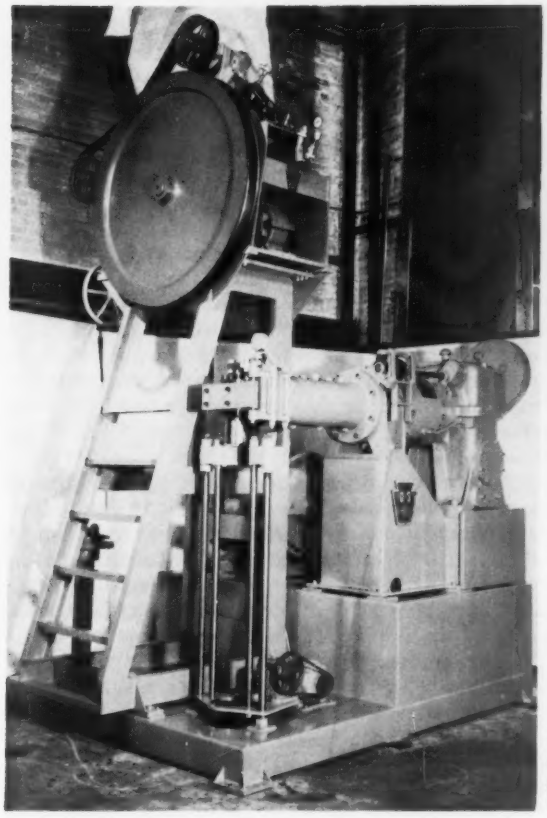
A NEW process for vulcanizing rubber wire insulation as it leaves the extruder, called vertical continuous vulcanizing, has eliminated much of the damage which was formerly inflicted on the soft insulation before it was cured. Originated by Davis-Standard Division of Franklin Research Corp., Mystic, Connecticut, the basis of the design involves substitution of a vertical vulcanizing tube for the horizontal one previously used. A schematic diagram of the machinery arrangement is shown in Figure 1.

Damage to rubber wire insulation from the time it leaves the extruder crosshead until the vulcanization or curing process is complete has long been a problem of the electrical cable industry. Soft compounds, such as butyl rubbers, are highly vulnerable to scuffing, flattening and scoring until they have been set by vulcanization. This damage to the uncured insulation becomes more of a problem as the wire or cable size and insulation thickness increase.

The basic characteristics of unvulcanized rubber compounds, namely that they are extremely soft yet have no resiliency, and that they are so tacky that they tend to fuse together on contact, have always been a problem. Any pressure—including its own weight—against a solid object will change the conformation of the insulation and therefore reduce its physical and dielectric strength. Handling the uncured insulation without damaging it is the problem which has been solved by vertical continuous vulcanizing.

One early method of handling wire during the vulcanizing process has been to carefully coil the insulated wire by hand into a large rotating pan as it leaves the extruder. A talcing agent such as soap-

of applying rubber insulation to wire



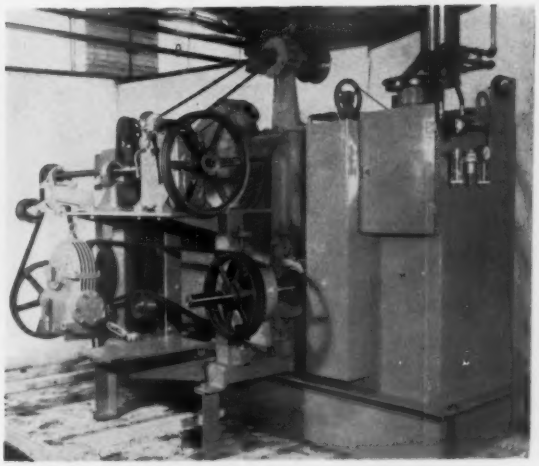


FIG. 3—Rear view of a 48-inch dual capstan arranged for the vertical continuous vulcanizing operation. The vulcanizing tube enters the capstan flange on the top right. A water seal is incorporated into the capstan housing at this point.

FIG. 2—A rubber extruder with drive mounted on special Vertical CV bed plate. A 48-inch diameter drag capstan and cable lift sheave are shown at upper left, and a motorized splice box is located in the foreground directly under the extruder head.

stone is liberally sprinkled on and around the insulation to overcome its tackiness and the pan is placed in a large steam pressure chamber where it is vulcanized. This method has several obvious drawbacks. The length of wire is limited by the capacity of the pan and the relatively short segments obtained must be spliced together. The insulation is somewhat deformed since it is bound to cross over itself quite frequently during this panning operation. And, of course, there is considerable manual work and a number of costly operations involved in a process of this kind.

A later method—known as continuous vulcanizing—involves the use of a horizontal tube leading from the extruder crosshead. The tube is generally divided into two sections which can be individually charged with steam and water at controlled temperatures. Vulcanization and cooling of the insulation is virtually completed within the tube before the wire reaches the capstan. Tubes can be lengthened as needed to provide greater vulcanizing time and correspondingly higher wire speeds.

This continuous vulcanizing process permitted longer runs at higher speeds, yet scuffing, scoring and flattening of the insulation, especially on wires with a high copper or aluminum content, still occurred as the insulation passed through the seals and along the bottom of the tube.

There were rumors through the cable industry that vertical curing had been done and after discussion with leaders in the wire industry, at their request, we initiated the development of a vertical continuous vulcanizing wire line. Although this appears to be a radical departure from the conventional horizontal

FIG. 4—A 60-inch sheave used in the vertical continuous vulcanizing line for large diameter cable when a caterpillar capstan is required. This sheave has the water seal housing for the foot of the vulcanizing tube mounted on it. The sheave housing can be filled with water for additional cooling of the insulation.

operation used throughout the wire industry, the advantages of the vertical system make it highly desirable.

The Vertical Process

The basic premise of a vertical continuous vulcanizing line is that insulated wire passing downward through a vertical tube would not come in contact with the side of the tube or any solid surface until the insulation had been vulcanized. The length of the tube, however, is limited by the height at which the extruder can be installed. We felt that the necessarily shorter vertical tube with its lower feet per minute output would still be practical in view of the increase in insulation quality and elimination of handling which could be obtained.

In a typical Vertical CV installation, one of our conventional rubber extruders with a special vertical crosshead is mounted on a platform or tower at the highest practical level in the plant. (Figure 2). Modified hinge fittings permit the crosshead to be opened and closed in the vertical position. Located above the extruder is a reversible drag capstan which creates a resistance to any change of wire speed through the extruder. This dual purpose capstan is also used to lift the wire from the pay-off reel below when starting a run and to extract wire from the vulcanizing tube in the event of shutdown.

A splice box, under the crosshead and at the top of the Vertical CV tube, is opened and closed by an electric motor and has a diaphragm-operated steam inlet valve with remote control.

Simplification of Equipment Design

The vertical tube itself is a much less complicated mechanism than its horizontal counterpart. The vulcanizing section and cooling leg are in effect one continuous tube with water admitted under pressure at the bottom and steam at the top. A patented water level control device regulates the height of the cooling water at the bottom of the vertical tube to within ⅜-inch differential. The conventional steam seal and its housing have been eliminated completely.

The pulling capstan, located at the foot of the vulcanizing tube, has been modified to include the water seal and again this separate housing has been eliminated (Figure 3). Expansion of the tube due to temperature change is accommodated downward into the capstan housing at the water seal position, thereby eliminating the need for an expansion joint in the vulcanizing tube.

A conventional pay-off reel stand and take-up reel stand are utilized in the Vertical CV operation. They are normally situated, with the pulling capstan, on the main floor of the plant for convenient reel handling and accessibility. A sheave is used for large diameter cable when a caterpillar capstan is required (Figure 4).

It is obvious that pre-heating of the wire before extrusion will actually contribute to the vulcanization process by applying heat at the core of the insulation. This desirable pre-heating, a distinct advantage with most electrical conductors, can be automatically accomplished in vertical vulcanization as the wire passes upward to the extruder. A simple steam jacketed pre-heating tube has given excellent results without utilizing any additional floor space.

Our first Vertical CV machine was developed for continuous curing of large diameter specialized cables with insulation thicknesses up to 27/64-inch. The vulcanizing tube was relatively short in length with a resultant lower feet per minute output than the horizontal machine performing the same operation. However, the higher quality of the finished product resulted in a greater over-all production through a marked decrease in test failure rejections. Better concentricity, more uniform diameter, and higher values for spark and corona level tests are achieved on vertically vulcanized insulation. The finish on cables extruded by this method is comparable to the finish normally found on cables cured in lead.

The advantages of Vertical CV are quite obvious. The vulcanizing tube has been eliminated as a hazard to soft insulation. We feel that in time the wire industry will make provisions for placing the extruder considerably higher in position, thereby permitting longer vulcanizing tubes and correspondingly greater operating speeds.

A simple formula for determining

How Many Cavities to Use In a Molding Operation

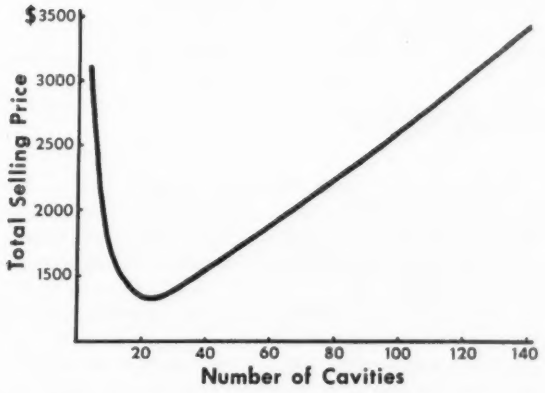
By WILLIAM E. KELVIE
50 Oak St., Braintree, Mass.

HOW MANY cavities? This is a question that every rubber cost estimator asks himself several times a day. Depending on the cost of one mold cavity he must decide on how many he should use to agree with the sales volume indicated by his customer.

If the estimator decides on too few cavities, his low tooling prices will be more than offset by his high piece price, raising the total price for the quantity of rubber parts involved. The same result of increased prices is also produced, of course, if too many cavities are used.

To illustrate the effect of incompatible tooling and sales volume, suppose that a customer requests a quotation on 10,000 pieces. The toolmaker estimates a $20 per cavity selling price for a mold to produce the parts. The following cost factors have been determined:

Standard platen—hour charge	$2.40
Cycle time	15 minutes
Mixed stock per thousand pieces	$10.00
Blanking operation per thousand pieces	$5.00
Finishing costs per thousand pieces	$15.00
Scrap allowance	10% of manufactured cost
Mark-up for commercial burden and profit	50% of manufactured cost



Number of cavities versus total selling prices of ten thousand pieces.

A worksaver for the estimator

One now has enough information to arrive at a total selling price for the 10,000 parts and a mold, except for one thing—the number of cavities. In order to realize the importance of this figure, consider the following quotations, each one using a different number of cavities. Notice what happens to the total selling price.

Number of cavities	Selling price of 10,000 pieces	Selling price of mold	Total Selling Price
4	$3000	$ 80	$3080
6	2166	120	2286
9	1611	180	1791
16	1125	320	1445
20	1000	400	1400
22	955	440	1395
25	900	500	1400
36	778	720	1498
49	704	980	1684
64	655	1280	1935
81	623	1620	2243
100	600	2000	2600
144	569	2880	3449

A graphical representation of the number of cavities (column 1) versus their respective total selling prices (column 4) is shown in the accompanying illustration. It is obvious that 22 is the ideal number of cavities to use, and 25 or 5 x 5 the most practical to build.

It would be time consuming to make up several prices based on varying numbers of cavities. The cost estimator for a company whose figures match those given above could make his decision in less than a minute by using the following formula:

$$N = \sqrt{\frac{4V}{CT}}$$

where
N = Number of cavities,
V = Volume of sales in total pieces,
C = Cycles per hour, and
T = Tooling price of one cavity.

Applying this formula to the illustration, the equation becomes:

$$N = \sqrt{\frac{4 \times 10{,}000}{4 \times 20}} = 22 \text{ cavities}$$

This particular formula applies to the company in the example, but one can be easily developed for any manufacturer by substitution in the basic formula, which is as follows:

The most economical number of tooling units is equal to the square root of the product of the following three factors:

$$(1)\ \frac{1 + \text{Mark-up (in decimals)}}{1 - \text{Scrap (in decimals)}},$$

$$(2)\ \frac{\text{Operation Cost Per Hour}}{\text{Cycles Per Hour}}, \text{ and}$$

$$(3)\ \frac{\text{Expected Sales Volume in Pieces}}{\text{Selling Price of one Tooling Unit}}.$$

The equation may be expressed as below:

$$N = \sqrt{\left(\frac{1+M}{1-S}\right)\left(\frac{\text{Cost Rate}}{C}\right)\left(\frac{V}{T}\right)}$$

If the mark-up, scrap, and operation hourly cost rate are constant for all quotations, the basic formula may be simplified. These factors were constant in the company used in the illustration so its cost estimator would always depend on this formula:

$$N = \sqrt{\frac{4V}{CT}}$$

The estimator arrived at this simplified equation by substituting the constants in the basic formula:

$$N = \sqrt{\left(\frac{1+.5}{1-.1}\right)\left(\frac{2.40}{C}\right)\left(\frac{V}{T}\right)} = \sqrt{\frac{4V}{CT}}$$

A formula for any company may be the same except for the number 4. (A mnemonic aid to remember the letters and their positions is to think of the two states of Vermont and Connecticut. The first runs north and south and the other is below it running east and west.)

A similar formula may be developed to decide on the number of units to quote for a clicker die. Assume the above company charges $5.40 per hour for a clicker press and operator. The formula becomes:

$$N = \sqrt{\left(\frac{1.5}{.9}\right)\left(\frac{5.40}{C}\right)\left(\frac{V}{T}\right)} = \sqrt{\frac{9V}{CT}}$$

If one applies this to the figures used for illustration with the additional information that the press makes 300 cycles or strokes per hour and the selling price of one die unit is $15, one can substitute as follows:

$$N = \sqrt{\frac{9 \times 10{,}000}{300 \times 15}} = \sqrt{20} = 4 \text{ gang die}$$

The formula could be adapted for use in other industries such as gasket and metal stamping.

Proof of Basic Formula

The total selling price, which it is desirable to hold to a minimum, is composed of the tool selling price and the parts selling price. Substitute for these two items the components from which they were developed. Use the same symbols as in the illustration. "N" represents the number of cavities, "R" represents the total hourly cost rate of the operation involving tool, etc.

The total selling price now becomes:

$$NT + V\left(\begin{matrix}\text{Material cost} + \text{1st} \\ \text{Operating cost} + \text{2nd} \\ \text{Operating cost} + \ldots.\end{matrix}\ \frac{R}{CN}\right)\left(\frac{1+M}{1-S}\right)$$

By use of the differential calculus, the derivative of the above with respect to the variable N becomes:

$$T - \frac{VR}{CN^2}\left(\frac{1+M}{1-S}\right)$$

To find the number of tooling units that will give the minimum total selling price, this derivative is made equal to zero and the resulting equation is solved for N.

$$N = \sqrt{\left(\frac{1+M}{1-S}\right)\left(\frac{R}{C}\right)\left(\frac{V}{T}\right)}$$

Radio Waves Influence Cell Behavior

THE discovery that radio waves can affect the behavior of cells has been reported by a team of scientists. It is believed that the discovery may have far-reaching effects in medicine as well as in industry. The findings, released by John H. Heller, A. A. Teixeira-Pinto and John L. Cutler of the New England Institute for Medical Research, Ridgefield, Conn., have to do with the behavior of many living and non-living substances, including carbon and polystyrene particles.

Cells of the substances have been found to be oriented by pulsed radio frequencies. Though at present the scientists cannot explain the phenomenon, their best guess is that the particles under an impressed radio frequency tend to line up so that there is minimal distortion of the field. They are, however, able to reproduce the effect predictably. It is too early to say what the implications of the new discovery are for industry, though it is believed that a rich field for exploration has been opened.

Division of Rubber Chemistry, A.C.S., Meets in Los Angeles May 13 through 15

THE 75th meeting of the Division of Rubber Chemistry of the American Chemical Society will be held at the Biltmore Hotel in Los Angeles, California, on May 13 through 15. The three-day meeting will feature the presentation of 38 technical papers. Other activities of interest will include a luncheon-meeting of the Twenty-Five Year Club, a business meeting and a division banquet.

The technical program has been divided into five sessions, with the first two scheduled to be held concurrently on Wednesday afternoon, May 13. G. T. Gmitter, General Tire & Rubber Co., will preside over a symposium on "Urethane Foams and Elastomers," and W. J. Sparks, Esso Research & Engineering Co., will serve as chairman for the other session, which will be on "Effect of Ozone on Rubber."

Program of the

DIVISION OF RUBBER CHEMISTRY
AMERICAN CHEMICAL SOCIETY

Biltmore Hotel, Los Angeles, California
May 13-15, 1959

Wednesday Morning—May 13

9:00 A.M.—Registration.
11:30 A.M.—Twenty-Five Year Club Luncheon (E. G. Partridge, Chairman).

Wednesday Afternoon—May 13

2:00 P.M.—Technical Session A, "Urethane Foams and Elastomers."
Technical Session B, "Effect of Ozone on Rubber."

Thursday Morning—May 14

9:00 A.M.—Technical Session, "Effect of Ozone on Rubber—Continued."
11:00 A.M.—Business Meeting.

Thursday Afternoon—May 14

2:00 P.M.—Plant Trips.

Thursday Evening—May 14

6:30 P.M.—Division Banquet (Beverly Hilton Hotel).

Friday Morning—May 15

9:00 A.M.—Technical Session A, "General Papers."
Technical Session B, "General Papers."

The only technical session to be held on Thursday, May 14, will also be on the subject of "Effect of Ozone on Rubber," and will feature six additional papers on this topic. Scheduled for the morning hours, the session will be presided over by H. A. Winkelmann, Dryden Rubber Division, Sheller Manufacturing Corp. The business meeting will be held during this session at 11:00 a.m. Plant trips are to occupy the afternoon.

The remaining two technical sessions will be held concurrently on Friday morning, May 15. One, presided over by B. R. Snyder, R. T. Vanderbilt Co., will be composed of general papers, most of them on rubbers. The other, which will also feature general papers, most of which are on vulcanization, will have as its chairman A. J. Hawkins, Jr., E. I. du Pont de Nemours & Co., Inc., Los Angeles, California.

The division banquet is to take place on Thursday, May 14, at 6:30 p.m. at the Beverly Hilton Hotel in Los Angeles. At this time a special award will be made to the authors of the best technical paper presented at the previous meeting of the Division, which was held in Chicago, Illinois in September, 1958. This honor will go to T. C. Williams, R. A. Pike and F. Fekete, Silicones Division, Union Carbide Corp., for their paper, "Cyanosilicone Elastomers—A New Class of Solvent Resistant High Temperature Rubbers."

A feature of the evening is to be a "Champagne Ride" from the convention headquarters to the site of the division banquet, which will combine the opportunity to see points of local interest with a suppliers' cocktail party.

Ladies' entertainment has been arranged and will include such typical California excursions as a trip to Disneyland.

Co-chairmen for local arrangements are Mr. Hawkins and Mr. Snyder. E. G. Partridge, University of Southern California, will act as chairman of the luncheon-meeting of the Twenty-Five Year Club.

Abstracts of the technical papers to be presented at the meeting follow herewith.

Wednesday Afternoon—May 13

Technical Session A

Urethane Foams and Elastomers

G. T. Gmitter, Presiding

2:00 P.M.—1A—Introductory Remarks. *E. H. Krismann, Division Chairman.*

2:10 P.M.—2A—Urethane Polyether Prepolymers and Foams—Influence of Chemical and Physical Variables on Reaction Behavior. *H. G. Scholten, J. G. Schuhmann and R. E. TenHoor (Dow Chemical Co., Midland, Mich.). (Paper will be presented by Mr. Schuhmann).*

For several years the principal guides for process control of urethane polyether prepolymer manufacture have been time, temperature, viscosity, and excess isocyanate content. These tools have not been adequate and extensive investigation has now defined the "CPR" relationship, probably the single most critical factor influencing prepolymer processing and foam characteristics. The controlled polymerization rate factor is calculated from data based on a group of accurate and reproducible analytical tests applied to the polyglycol and diisocyanate raw materials. Polymerization character is defined by a constant viscosity/temperature monitoring device and other instrumentation techniques. The total data provides a technological framework of useful tools for producing specific prepolymers and foams.

Improper control of the factors making up the CPR relationship can lead to gelation or inadequate linear and/or branching polymerization. In addition, cell collapse, heat or humidity degradation, and/or inadequacy in physical properties of the foam can result even though certain adjustments are possible, though with less definition and control, at the foam head phase of the operation.

The influence of the CPR factor on polyether diols versus triols and on polyethers having secondary versus primary hydroxyls is described. Furthermore, the ramifications of these variables in one-shot polyether systems are explored.

The influence of the physical variables of prepolymer processing equipment is outlined and reliable extrapolation from a few key checkpoints appears practical from 200 grams to 2000 gallon batches. More difficulty controllable conditions surround the foaming operation with each foam machine of individualistic temperament. However, more latitude is permissible in foam processing than in the highly critical prepolymer stage where trace quantities of impurities must be balanced quantitatively.

2:35 P.M.—3A—One-Shot Foaming of Polyether-Polyurethanes with Organometallic Tin Compounds. *F. Hostettler and E. F. Cox (Research Department, Union Carbide Chemicals Co., South Charleston, W. Va.). (Paper will be presented by Mr. Hostettler).*

In the manufacture of flexible polyurethane foams two processes are of commercial importance. The so-called one-shot process is applied particularly with the polyesters and consists of mixing the foamants simultaneously in the mixing-head and the foam is formed in one step. With polyethers, this process has only recently been made possible by the introduction of more active catalysts. In general, polyether intermediates possess low viscosity and most products contain predominantly secondary hydroxyl groups, consequently, exhibiting lesser reactivity than polyesters which have primary hydroxyl groups. To overcome slow reactivity and low viscosity, the prepolymer process which consists of prereacting polyethers with diisocyanates to form high viscosity prepolymers having isocyanate end-groups was introduced several years ago. The prepolymer is converted to foams by admixing catalyst, surfactant and water. Fundamental studies of new isocyanate catalysts in our laboratory have led to the discovery of many extremely effective catalyst systems which enable one-step foaming of polyethers.

Based on our discovery that certain organometallic compounds accelerate the reaction of isocyanates with compounds containing an active hydrogen atom more efficiently than tertiary amines, several hundred compounds were compared as catalysts. The reaction of phenyl isocyanate with butanol in dioxane as the solvent at 70°C. served as a model reaction for the comparison of catalysts. The following isocyanate catalysts are listed in order of increasing catalytic activity: Triisooctylamine, N,N′-bis(2-hydroxypropyl)methylpiperazine, N-ethylmorpholine, N-methylmorpholine, N-methyldiethanolamine, triethylamine, N,N,N′,N′-tetramethyl-1, 3-butanediamine, triethylenediamine, ferric acetyl acetonate, stannous chloride, stannic chloride, tetrabutyltin, tributyltin acetate, tributyltin chloride, butyltin trichloride, octyltin trichloride, octylstannonic acid, dibutyltin dilaurylmercaptide, dibutyltin sulfide, bibutyltin di-2-ethyl-hexanoate, dibutyltin dilaurate, dibutyltin diacetate, and dibutyltin dichloride.

Organometallic compounds of tin, that is, compounds containing at least one carbon to tin bond, are particularly outstanding as isocyanate catalysts. Within the tin series, dialkyltin compounds are unusually effective.

In order to obtain a measure of the performance of the novel catalysts in foaming reactions a second series of model reactions was conducted wherein phenyl isocyanate was reacted with butanol (chain extension reaction), water (foaming reaction) and diphenyluria (cross-linking reaction). It was observed that the relative ratio of the reaction rates of the phenyl isocyanate with butanol versus the rate of the phenyl isocyanate reaction with water is high in the case of organometallic tin catalysts but relatively low in the case of tertiary amines. This means that in one-shot processes the tin catalysts are capable of substantial polymer formation before gas evolution becomes rapid, whereas with tertiary amine catalysts the gas evolution is too rapid in relation to the polymer-foaming reaction resulting in partial foam collapse.

During the experimental foaming work it was observed that catalyst combination systems of tin compounds of the type referred to above and tertiary amines lead to more rapid foaming and curing than tin catalyst systems by themselves. Careful examination of this phenomenon by means of rate studies proved this to be a synergistic effect. Depending on the tin compound the three reactions of importance in the foaming process can be accelerated over and above the rates observed with tin compounds alone by a factor of from two to five by addition of small amounts of tertiary amines. The chemical structure of the tertiary amine seems to have little influence upon the synergistic effect.

The above discovery of the high activity of the organometallic tin compounds made possible the development of a one-shot process for foaming polyether intermediates based on propylene oxide. Surfactant systems consisting of polyoxalkylene-polydimethylsiloxane block-copolymers are essential for successful foaming operation. Foam formulations with various polyether systems will be presented and the effect of different variables on foam properties will be discussed.

Aging properties of one-shot polyether foams prepared by tin catalysis are now being investigated. At temperatures above 100°C. oxidative degradation of foams catalyzed by some tin compounds is observed. This can be overcome to a substantial extent by addition of antioxidants. Long-term lower temperature exposure studies of such foams are needed to predict the performance of foams in actual use.

3:00 P.M.—4A—Some Properties and Applications of Loaded Flexible Urethane Foams. *S. J. Assony and S. Chess (Freedlander Research and Development Laboratories, American Latex Products Corp., Hawthorne, Calif.). (Paper will be presented by Mr. Assony).*

Flexible polyesterurethane foams in general exhibit a marked plateau in their stress-strain curves (bottoming effect), do not possess a quick return, are not readily moldable and are not easily obtained in higher densities. These limitations preclude the use of polyesterurethane foams from many appli-

cations wherein their otherwise desirable properties might be utilized to advantage. Incorporation of suitable reinforcing fillers into the foam reduces or eliminates the bottoming effect and imparts a rubberlike quick return. Other physical properties are also improved. Loaded flexible urethane foams are readily moldable in inexpensive tooling, forming a skin which accurately reproduces the mold finish. Obtainable densities range from 8 to 80 pounds per cubic foot.

Loaded foams in molded form and sheet stock are finding useful applications in assemblies wherein oil, oxygen, ozone and fatigue resistance are important factors. Since the physical properties of these foams can be varied within rather broad limits, they are also utilized in specialty applications for which no previously known single material has been suitable.

3:25 P.M.—5A—The Mechanism of the Water Reaction with Isocyanates. ***G. Shkapenko, G. T. Gmitter and E. E. Gruber (Central Research Laboratories, General Tire & Rubber Co., Akron, Ohio). (Paper will be presented by Mr. Gmitter).***

The reaction of water with isocyanates plays an essential part in the foaming of urethanes. Besides providing the carbon dioxide necessary for blowing, this reaction serves to provide chain extension and cross-linking in the polymer phase.

In order to clarify the nature of this reaction, the hydrolysis of simple isocyanates was studied in the presence of tertiary amine catalysts. The reactions were followed by measurements of the rate of isocyanate functionality consumption as well as by the rate of carbon dioxide evolution. Greatest emphasis was placed on the study of the reaction involving water and ortho tolyl isocyanate.

This reaction is quite complex and reaction intermediates and patterns will be discussed in the light of this study. The first product formed in the reaction of water with ortho tolyl isocyanate is the substituted carbamic acid. In addition to the decomposition of this carbamic acid to form ortho toluidine and carbon dioxide, the carbamic acid reacts with isocyanate to form some 35 per cent of the the carbamic acid anhydride. The ortho toluidine formed in the carbamic acid decomposition not only reacts with additional isocyanate to form the urea derivative, but also reacts with some of the undecomposed carbamic acid to form 4 to 5 per cent of the amine salt of this acid.

The reaction of this isocyanate with ortho tolyl urea proceeds at an appreciable rate to form the biuret. Such reaction undoubtedly has a significant role in the total hydrolysis reaction.

The over-all water reaction with isocyanates is discussed in view of these intermediates established by this study.

3:50 P.M.—6A—"Chemical Compounding" of Liquid Urethane Elastomers. ***R. J. Athey (Elastomers Laboratory, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.).***

Liquid urethane elastomers are well suited for the preparation of very hard vulcanizates which combine hardness with resilience, toughness, and oil and abrasion resistance. They are of interest to elastomer product manufacturers because of the wide variety of mechanical properties obtainable which allows unusual product design.

A family of elastomers is obtained through chemical modification of the polymer structure. This paper discusses the effect of compounding and processing variables on the mechanical properties of the vulcanizate. A systematic study of curing temperature, the amount of curing agent, the use of added diisocyanate, and the molecular weight of the liquid polymer is reported. These data have been treated statistically and the design of urethane compounds for specific applications has been simplified.

These studies have yielded unusually hard vulcanizates which approach the properties of plastic resins but exhibit resilience, impact strength and excellent resistance to low temperature embrittlement characteristic of elastomers.

4:15 P.M.—7A—The Development of Cast Urethane Elastomers for Ultimate Properties. ***K. A. Pigott, B. F. Frye, K. R. Allen, Samuel Steingiser, W. C. Darr, J. H. Saunders and E. E. Hardy (Research Department, Mobay Chemical Co., New Martinsville, W. Va.). (Paper will be presented by Mr. Frye).***

The past history of polyester-based polyurethane elastomers has been concerned mainly with developing an elastomer with properties that were optimum in all respects. Little has been reported on how to vary molecular structure to improve specific physical properties, such as low temperature flexibility and high temperature resistance, load bearing, etc. This research is being carried out in order to develop a better working knowledge of the effect of changes in molecular components and types of cross-linking on the ultimate physical properties of the polyester urethane elastomers.

Three groups of materials can be varied to produce changes in the final product: polyester, diisocyanate and chain extender. By varying the component parts of the polyester (i.e., the dibasic acid and the dihydroxy compound), the cured material can be a hard, semi-plastic material, a soft elastomer or anything in between. By changing the diisocyanate used (and the quantity used), a wide range of hardnesses, moduli, and tear strengths can be obtained. The chain extenders fall into two sub-groups: (1) difunctional and (2) tri- or polyfunctional. When aliphatic glycols up to six carbons in length are used, little change in physical properties are noted. However, with alkylaryl glycols, substantial changes are noted when the molecular structure of the glycol is modified. With trihydroxy compounds, the physical properties change as the per cent of the polyhydroxy compound used increases.

In all of this work, the goal has been to interpret the changes in physical properties as a function of the intermolecular forces involved, the type and extent of chemical cross-linking that is present. By using these guides it is now beginning to be possible to develop elastomers which are truly "tailor-made" for specific end applications.

Technical Session B

Effect of Ozone on Rubber

W. J. Sparks, Presiding

2:00 P.M.—2B—Compounding Variables Affecting Antiozonant Requirements. ***William L. Cox (Universal Oil Products Co., Des Plaines, Ill.).***

Previous studies of the effect of compounding variables on the antiozonant requirements of typical compounds have been extended to include the effect of processing and extending oils, the SBR/NR (styrene rubber/nitrile rubber) ratio in mixed polymers, and the effect of the wax selected for testing antiozonant-wax combinations.

The data reveal only a slight increase in antiozonant requirement when the process oil concentration in an SBR sidewall formulation is varied from 0 to 10 phr. However, with SBR stocks based on carbon black mastermatches, both cabinet and outdoor tests show a 50% increase in the antiozonant requirement of an oil-extended polymer over that of the oil-free material.

Work with SBR-NR blends shows no significant increase in the concentration of N, N′-dioctyl-p-phenylenediamines needed to protect stocks containing 0 to 20% NR.

The antiozonant-wax studies indicate the potential error in comparing as antiozonants even somewhat similar compounds in wax-containing stocks. Waxes differ so widely in their "compatibility" with antiozonants that through an improper selection of the wax used in comparative studies, erroneous generalizations as to the relative merits of antiozonants under consideration may be reached.

2:20 P.M.—3B—The Ozone Resistance of Styrene-Butadiene Rubber at Low Temperatures. *Richard F. Grossman and Allen C. Bluestein (Research Laboratories, Anaconda Wire & Cable Co., Marion, Indiana). (Paper will be presented by Mr. Grossman).*

There has been an increasing use of styrene-butadiene vulcanizates for extreme low temperature service where resistance to weathering and/or abnormally high concentrations of ozone is required. Very little work has been reported on the effect of low temperature on ozone resistance. The resistance of styrene-butadiene vulcanizates to ozone degradation is reported over the 20 to —60°C. temperature range.

Samples ozonized under high physical stress are found to have ozone failure times independent of ambient temperature. At low applied stress a marked temperature dependence is observed above a critical temperature typical of the stress involved. At temperatures below this value, the time required for ozone cracking to occur approaches infinity at ozone concentrations below 0.10 per cent.

This discontinuity greatly exceeds the loss in reaction velocity with decreasing temperature predicted by simple kinetic considerations. Its occurrence is interpreted as a shift from ozonide formation to ozonide decomposition as the rate determining step in the ozone degradation process. The decomposition of the rubber ozonide is subject to two influencing factors: temperature and applied physical stress. The experimental data are correlated with the instability of the ozonide at high applied stress, and above a critical temperature.

The results of this study imply that under low stress the ozone resistance of SBR at low temperature is far superior to what would normally be predicted.

2:40 P.M.—4B—A Method of Screening Antiozonants. *F. A. V. Sullivan and Arnold R. Davis (Research Laboratories, American Cyanamid Co., Bound Brook, N. J.). (Paper will be presented by Mr. Sullivan).*

A method has been developed for screening organic compounds for testing as antiozonants in rubber. The method is based upon the determination of the ability of the compounds to suppress the reaction of ozone with a model unsaturated hydrocarbon, cyclohexene. The compound being tested is dissolved in a solvent inert toward ozone, carbon tetrachloride, together with excess cyclohexene, and the solution subjected to a stream of ozonized air for a period of time.

The ability of the compound to suppress the reaction of ozone with cyclohexene is determined by measuring the rate at which ozone is consumed in the reaction. The rate at which ozone is consumed is determined by analyzing the effluent air stream for changes in oxygen concentration, equivalent to ozone, by means of a Beckman Oxygen Analyzer. The reactivity of a number of compounds evaluated by this method are compared to the reactivity of a known antiozonant which is used as a reference standard.

3:00 P.M.—5B—Correlation of Ozone Chamber and Outdoor Exposure. *H. A. Winkelmann (Dryden Rubber Division, Sheller Manufacturing Corp., Chicago, Ill.).*

Observations on outdoor exposures started in April, 1952 have been continuing up to the present time. Comparisons are made with exposures in the ozone chamber using 25 parts ozone per 100 million parts of air at 100°F. A 50 hardness extruded styrene rubber compound was used in this study. A masterbatch without sulfur, accelerator or wax was mixed in a Banbury. Sulfur, accelerator, and various chemicals were added on a laboratory mill. Wax was added in a molten condition. Test strips were extruded through a triangular die. Samples were exposed on two-inch diameter wooden mandrels and rated according to ASTM D-1171.

Ozone exposure tests correlate closely with short time outdoor exposure tests. After 6 to 7 years exposure there is a greater degree of cracking than shown by the ozone chamber. It is noted that strips cut from one length of compound may show a rating of 0 in the ozone chamber and yet will give ratings of 1, 2, or 3 on outdoor exposure. Conversely, in many instances, the ozone chamber gave a rating of 3, while outdoor exposures after seven years exposure still show a rating of 0, 1, or 2.

Exposed samples may fail due to other reasons than ozone cracking. Such failures seldom show up in the ozone chamber. These failures are splits, flow lines or flow cracks, due to poor flow or lack of knitting. Poor dispersion may cause pits when pigment agglomerates drop out. A sample that is satisfactory in the ozone chamber may fail on outdoor exposure for causes other than ozone cracking.

3:20 P.M.—6B—Comparative Performance of Antiozonants in Road and Accelerated Tests in the Los Angeles Area. *Frank B. Smith (Naugatuck Chemical Division, United States Rubber Co., Naugatuck, Conn.).*

The comparative performance of several commercial antiozonants was studied in tires by means of road and accelerated tests in the Los Angeles area. The relative effectiveness of these chemicals *as antiozonants* is examined and discussed. Correlations are noted between the accelerated tests and actual tire performance and conclusions drawn. The chemical N-phenyl-N′-isopropyl-p-phenylene diamine is shown to exert extremely powerful protection against ozone checking in the Los Angeles area.

The relative value of commercial antiozonants *as antioxidants* was also studied in laboratory tests and on the road in nylon heavy-duty tires. Truck tire performance in the Los Angeles area is contrasted with comparable commercial truck tire tests in Texas and in the Midwest. N-phenyl-N′-isopropyl-p-phenylene diamine inhibits groove cracking in nylon heavy-duty tires by a factor of approximately 400%. The dual protective value of N-phenyl-N′-isopropyl-p-phenylene diamine will be useful in extending the service life of passenger and truck tires.

3:40 P.M.—7B—Resistance of Rubber Compounds to Outdoor and Accelerated Ozone Attack: II. *G. N. Vacca, G. H. Bebbington and R. E. Johnson (Bell Telephone Laboratories, Inc., Murray Hill, N. J.). (Paper will be presented by Mr. Vacca).*

Because of the limited study of natural rubber included in the first paper [Lundberg, C. V., Vacca, G. N., and Biggs, B. S., "Resistance of Rubber Compounds to Outdoor and Accelerated Ozone Attack," *Rubber World*, Vol. 135, p. 699 (1957)] it was felt that this area should be covered more extensively. A tire tread type formulation was chosen as a base compound because in addition to its use in tires, it bears some resemblance to wire and cable jackets. In all, 18 waxes and 19 chemical additives were used. Each wax and each chemical was used by itself in 1½ and 3 phr concentration. One wax which had shown much promise in earlier work was then used in combination with each chemical in concentrations of 1½ wax, 1½ chemical and 3 wax and 3 chemical. Of the 19 chemicals, 6 are generally recognized as antioxidants while 13 are antiozonants.

All of the samples were prepared as press cured sheets. Specimens from the sheets were mounted on rods to give 30% stretch and other specimens were mounted as bent loops per Method B, ASTM D518-57T. One set of each type of specimen was placed in a Crabtree ozone chamber maintained at 25 pphm ozone and 120°F. and a similar set was exposed outdoors at Los Angeles. Behavior of the specimens under these conditions will be studied.

Two synthetic natural rubbers were included in this work. In these cases one wax alone and in combination with one chemical were added.

The results of outdoor exposure up to six months in Los Angeles will be compared with results obtained in the ozone chamber.

4:00 P.M.—8B—Wing-Stay 100 as an Antiozonant. *J. C. Ambelang and B. W. Habeck (Goodyear Tire & Rubber Co., Akron, Ohio). (Paper will be presented by Mr. Habeck).*

Wing-Stay 100, a stabilizer, antioxidant and flex crack inhibitor. was the subject of a paper presented by Spacht, Lichty and Hollingshead at the 1958 Chicago meeting. This mixed diaryl p-phenylene diamine is also an unusually persistent antiozonant and anti-weathering agent for SBR polymers. The persistence of Wing-Stay 100 is attributable to its low volatility and low oxidation rate in comparison with other commonly used antiozonants of the dialkyl p-phenylenediamine type.

Comparison in tread type recipes containing paraffin, indicate that 3 to 4 parts per 100 RHC of Wing-Stay 100 in SBR type 1500, or four parts per 100 RHC in SBR type 1712, result in excellent protection against static and kinetic exposure in either an ozone atmosphere or outdoor weathering.

This new material was compared with various antiozonants in SBR types 1500 and 1712 compounds. Data showed Wing-Stay 100 to be equal to, or somewhat less effective initially than the dialkyl-p-phenylene diamines in compounds exposed in ozone or to weather aging. However, when these same compounds were subjected to 48 hours aging at 212° F. before ozone or weather exposure, the Wing-Stay 100 protected stocks proved to be notably superior to those stocks containing dihydroquinoline or dialkyl-p-phenylene diamine antiozonants.

4:20 P.M.—9B—Accelerated Aging Tests and Outdoor Performance of Butyl Rubber. *W. W. Gleason and D. R. Hammel (Enjay Laboratories, Linden, N. J.). (Paper will be presented by Mr. Hammel).*

An analysis has been made of results of aging tests conducted on 250 butyl rubber compounds. Compounding variables included a wide variety of filler systems, curing mechanisms, plasticizer types and loadings, and ozone protective systems. Data have been collected over a three-year period relating accelerated ozone tests to outdoor aging in Metropolitan New Jersey, California, and Florida. Correlation of results indicates that outdoor weathering performance can be predicted with a good degree of accuracy on a statistical basis. The inter-related effects of compounding techniques, aging time, and conditions of exposure are discussed.

Thursday Morning—May 14

Effect of Ozone on Rubber—Continued

H. A. Winkelmann, Presiding

9:00 A.M.—10—The Operation of Ozone Chambers in Rubber Laboratories to Minimize Variation in Test Results. *H. Lowman (Goodyear Tire & Rubber Co., St. Marys, Ohio).*

In static ozone testing there was a very great variation in results between laboratories. Duplicate samples tested simultaneously in the same ozone test chamber showed variations in results from severe cracking to no cracking. Working committees of SAE and ASTM were formed to reduce this variation. This paper reports the results of these programs. On the compounds tested, it is now possible to have duplicate samples tested simultaneously in an ozone cabinet give duplicate results and a very high degree of reproducibility between laboratories. Changes made to secure better results were:

(1) A complete change of air in the ozone test chamber every one minute twenty seconds or oftener.

(2) A seventy-two hour rest period on the D-1171 mandrel in an ozone-free atmosphere before placing in the ozone test chamber.

(3) Care in handling the specimens.

The timing of the preparation of the preform after mixing or before vulcanization is of very minor importance. The effect of injection molding, compression molding, and open steam vulcanization on the ozone resistance of elastomers is given. The ratings 0, 1, 2, and 3 of ASTM D-1171 were used in most of these investigations. These are visual examination tests. Data are given to show that an operator can duplicate ratings 91%.

9:30 A.M.—11—Ozone Resistance of Rubber Insulations. *W. H. Couch, G. H. Hunt and O. S. Pratt (Simplex Wire & Cable Co., Cambridge, Mass.). (Paper will be presented by Mr. Hunt).*

This invesigation was undertaken in order to increase our understanding of the mechanism of ozone and corona cutting of rubber high voltage cable insulation and to develop the compounding knowledge necessary to exploit the inherently stable polymer butyl rubber as the base for such an insulation.

It was found that the relaxation of mechanical stress plays a very important role in the behavior of compounds exposed to ozone, and studies were made to establish the stress decay characteristics of various formulations based on natural rubber, SBR and butyl rubber. A method was developed for correlating the stress decay and ozone resistance characteristics which permits the performance of any formulation to be predicted at ozone concentrations up to 0.5%. Comparisons were made between the cutting in an intense corona discharge and that in high concentrations of ozone outside of the discharge. Predictions based on these studies correlate well with results of accelerated tests in corona discharge.

Tests were carried out in the products of corona discharge at pressures less than atmospheric. These tests lead to the conclusion that at very low pressures (ca. 1 mm. Hg) cutting is caused not by ozone but by atomic oxygen. Compounds based on a variety of polymers were exposed to atomic oxygen and some indications of their resistance to cutting were obtained.

10:00 A.M.—12—Weather Aging of Elastomers on Military Vehicles. *W. D. England, J. A. Krimian and R. H. Heinrich (Ordance Tank Automotive Command, Detroit Arsenal, Center Line, Mich.). (Paper will be presented by Mr. England).*

Prevention of ozone cracking of rubber is one of the more serious and important problems which confronts the Ordnance Corps. Soon after World War II, numerous reports were received from depots throughout the United States describing the severe deterioration of rubber components stored on military vehicles. To solve this problem, Ordnance Corps turned to development of surface coatings and additives to improve the ozone resistance of rubber components. Contracts were let with research laboratories to develop antiozonants and with tire companies to incorporate these antiozonants into end items which were evaluated for ozone resistance at Los Angeles and other test sites.

The results of static exposure tests have shown that SBR rubbers which crack during the first month of exposure in Pasadena, California, can be protected against ozone cracking one to two years or more with three parts of N,N'-2-octyl-p-phenylenediamine and one part wax. Likewise, nitrile rubbers were given the same protection with four parts of nickel dibutyl-dithio-carbamate (N.B.C.) and one part wax. Results also indicated the loss of ozone resistance when butyl and chloroprene rubbers, with inherent ozone resistance, are highly plasticized. Further, it was shown that such a loss can be regained by addition of suitable antiozonants and wax.

The importance of exposure tests at Pasadena and elsewhere are reflected in the issuance of Government specifications with rigid antiozonant requirements in the rubber end items.

10:30 A.M.—13—Chemical Inhibition of Ozone Degradation of SBR. ***H. W. Kilbourne, G. R. Wilder, J. E. Van Verth and J. O. Harris (Organic Chemicals Division, Monsanto Chemical Co., Nitro, W. Va.). (Paper will be presented by Mr. Kilbourne).***

A description of appropriate laboratory testing methods and a comparison of commercial antiozonants are given. The highest levels of antiozone activity are realized with disubstituted aromatic amines. The *para*-phenylenediamines, substituted di- and tetrahydroquinolines are the most active members studied. Variations in chemical structure of these compounds involving substitution of electropositive and electronegative groups effect significant changes in antiozonant activity. Steric influences are illustrated by comparing polysubstituted derivatives. A mechanism of chemical inhibition of ozone degradation of SBR is postulated.

11:00 A.M.—Business Meeting.

11:05 A.M.—14—Ozone Cracking of Rubber in the Los Angeles Area. ***A. J. Haagen-Smit (California Institute of Technology, Pasadena, Calif.), M. F. Brunelle (Los Angeles County Air Pollution Control District, Los Angeles, Calif.), and J. W. Haagen-Smit (A. O. Beckman, Inc., South Pasadena, Calif.). (Paper will be presented by Mr. J. W. Haagen-Smit).***

Cracking of rubber, due to the presence of ozone, was measured in the Los Angeles area by measuring the number of cracks and the crack depth after exposure of standardized bent rubber strips to the atmosphere. The cracking shows a daily and seasonal variation due to the difference in ozone concentration as well as difference in temperature.

The ozone concentration usually reaches a maximum during the day and is highest during the summer months. Its origin has been traced to the action of sunlight on mixtures of organic material and oxides of nitrogen, common air pollutants in urban areas. A comparison with chemical measurements of the oxidizing power of the air shows a similar trend.

The rubber test used is believed to agree more closely with the practical effects on rubber goods, since it integrates the variable action of ozone due to large fluctuations in its concentration and the reaction rate due to climatological factors. Results over a three year test period are presented, as well as a comparison with the oxidant values measured in the same areas.

11:35 A.M.—15—Factors Influencing the Ozone Resistance of Neoprene Vulcanizates under Flexure. ***R. M. Murray (Elastomers Laboratory, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.).***

The importance of using dynamic testing conditions has become increasingly apparent in evaluating the ozone resistance of elastomeric vulcanizates. Results obtained under mild conditions of flexure may be the reverse of those obtained when specimens are held under constant stress or strain.

An ozone chamber is described which has capacity for 24 cured compounds to be tested simultaneously under static and two different flexing conditions.

A comparison is given of the ozone resistance of vulcanizates prepared from a number of different elastomers and elastomer blends containing the same volume loading of SRF carbon black. Emphasis is placed on the effects of compounding ingredients (amount and type of loading, plasticizer, wax and especially antiozonant) on the ozone resistance of the neoprene vulcanizates. Increasing amounts of antiozonant are shown to provide increasing ozone protection, but bloom and scorch become serious limiting factors.

Note: Thursday afternoon, May 14, has been left open for plant trips.

Friday Morning—May 15

Technical Session A

General Papers

B. R. Snyder, Presiding

9:00 A.M.—16A—The Chelating Agent in Sulfoxylate Polymerization. ***R. D. Spitz and A. K. Prince (Dow Chemical Co., Midland, Mich.). (Paper will be presented by Mr. Prince).***

The effect of various aminopolycarboxylic acid chelating agents on a typical sulfoxylate polymerization recipe has been studies. The over-all recipe used was:

	Parts
Butadiene	70.00
Styrene	30.00
De-ionized Water	180.00
Diisopropyl Benzene Hydroperoxide	0.10
Sodium Formaldehyde Sulfoxylate Dihydrate	0.07
Potassium Palmitate	4.50
Tertiary Dodecyl Mercaptan	0.30
Potassium Chloride	0.30
Ferrous Sulfate (Heptahydrate)	0.02
Chelating Agent in Various Molar Ratios to Iron	
Temperature	5°C.
pH	10.5-10.6

Studies of only the polymerization rate were made, the system being designed to produce a 60% conversion level in six hours. No extensive measurement of the properties of the coagulated rubber was attempted.

Data obtained under closely controlled conditions of concentration, temperature, and pH will be presented to show:

(1) Of the group of chelating agents based upon ethylenediaminetetraacetic acid, diethylenetriaminepentaacetic acid, hydroxyethylethylenediaminetriacetic acid, di(hydroxyethyl) glycine, nitrilotriacetic acid and hydroxyethyliminodiacetic acid, only those based upon EDTA support the polymerization reaction.

(2) Differences in purity between reagent grade and commercial forms of EDTA appear to have no effect on the polymerization rate.

(3) The efficiency of the widely used commercial mixture of tetrasodium EDTA and sodium dihydroxyethylglycinate is apparently only due to the former material in the mixture.

(4) Varying the molar ratio of chelating agent to iron through the range 0.4 to 2.0 has little effect on the polymerization rate.

These data suggest an area of significant savings in raw material and handling costs to producers of sulfoxylate rubber.

9:20 A.M.—17A—Preparation and Physical Properties of Mixtures of Butadiene-Acrylic Acid and Butadiene-Vinylpyridine Elastomers. ***C. A. Uraneck and R. J. Sonnenfeld (Research and Development Department, Phillips Petroleum Co., Bartlesville, Okla.). (Paper will be presented by Mr. Uraneck).***

Butadiene-acrylic acid and butadiene-2-methyl-5-vinylpyridine copolymers were prepared and mixtures of these copolymers were evaluated in standard sulfur formulations and as green films. Recipes were developed for the copolymerization at 5°C. of butadiene and acrylic acid at monomer ratios varying from 95/5 to 60/40. No problem was encountered in the preparation of butadiene-2-methyl-5-vinylpyridine copolymers. Means of preparing stable mixtures of solutions and of latexes of the copolymers were developed.

Evidence of intermolecular action of the carboxylic and pyridyl groups can be obtained for mixtures of the copolymers in carcass and tread formulations if the zinc oxide and stearic acid contents are maintained relatively low, 1.0 phr each. All properties, stress-strain, dynamic, and static, were affected when the monomer ratios of the copolymers were

lower than 90/10. The bond formed was probably a weak hydrogen bond association because some of the properties, especially tensile, were markedly affected by temperature.

Green films prepared by mixing solutions or latexes of the copolymers demonstrated high tensile, 1800 to 3000 psi, if the monomer ratio was 50/50 butadiene-functional monomer and the mixing was performed under the proper conditions.

These results indicate that mixtures of elastomers containing functional groups capable of interaction is another variable which can be utilized in compounding these rubbers.

9:40 A.M.—18A—Constitution and Variability of Rubber Foam from Individual Trees. ***A. R. Kemp (Rubber Technology Foundation, University of Southern California, Los Angeles, Calif.).***

Special procedures are described for collecting, stabilizing and studying variations in rubber taken from individual trees. The color, hardness, solubility, intrinsic viscosity and gel content are shown to vary widely in rubber from 24 individual trees in a Costa Rica estate. These data are compared with those for crepe and smoked sheet. Some unpublished data obtained several years ago on different types of rubber grown in an experimental garden at Miami, Florida, are presented for comparison.

Fractionation, solubility and viscosity studies yield data throwing new light on the composite nature of the sol and gel components in rubber. The possible causes of the wide variations in rubber from individual trees are discussed.

Data are presented on the relative viscosity stability of pure rubber hydrocarbon in benzene solution when kept in the darkness and exposed to light. Light is shown to be the principal cause for the instability of rubber solutions which are very stable in darkness.

Fractionation studies on freshly tapped latex and crepe rubber have been carried out for comparison.

The results of the present investigation are compared with studies made by Bloomfield in Malaya on rubber latex as directly tapped.

10:00 A.M.—19A—Butyl Rubber Latex—A Review of Its General Properties in Non-Transport Applications. ***Alfred L. Miller and Kenneth W. Powers (Esso Research & Engineering Co., Linden, N. J.). (Paper will be presented by Mr. Powers).***

Previous publications with regard to butyl rubber latex have been concerned with tire cord adhesion. With the approaching commercialization of this new elastomer latex, evaluation and study have been expanded to many non-transport fields in which the unique combination of properties available in dry butyl rubber, such as low permeability to gases; good resistance to ozone, oxygen and chemicals; good gum tensile properties; and high elongation, could be advantageously applied in latex form. Some typical fields of application in which butyl latex shows probable utility include: adhesives, paper coating and proofing treatments, binder systems in textiles, and vulcanized films.

Data will be presented showing the unusually good mechanical and freeze-thaw stability of butyl rubber latex. A high tolerance for polyvalent ions, acids and bases and usefulness over a very broad pH range will also be described. Viscosity can be varied and controlled through the addition of commercial thickeners. Cure systems have been developed which show good activity at boiling water temperatures. More economical cure systems have been developed for use in the 240 to 260°F. range. Tensile, tear, and permanent set data will be presented on these cured films. In addition, pigment reinforcement effects in uncured, unsupported films will be discussed.

Studies of the interactions of butyl rubber latex with representative pigments and adhesives separately and together reveal satisfactory compatibility over broad concentration ranges. Pigment coated paper evaluations show butyl rubber latex to be of considerable interest with regard to a number of properties, such as print quality, ink holdout, etc.

10:20 A.M.—20A—Gel Formation in Styrene-Butadiene Rubbers. ***C. A. Carlton (J. M. Huber Corp., Borger, Texas).***

Cut growth of styrene-butadiene tire tread compounds has been a serious problem since the inception of the synthetic rubber industry. This study was undertaken (1) to determine the effect of processing conditions and various rubber compounding ingredients on the formation of gel in styrene-butadiene copolymers and (2) to determine the effect of gel on the physical properties of unvulcanized and vulcanized SBR compounds with particular reference to tire tread cut growth and cracking.

Gel formation during processing is a function of time and temperature. The amount formed is influenced by the type of processing since oxygen plays an important role in gel formation.

A comparison of the various commercial grades of styrene-butadiene rubbers reveals that nearly all form some gel during hot mastication. In general the oil-extended rubbers form less gel than the non-extended ones. Some few form no gel.

A study of the effect of accelerators, antioxidants, antiozonants, chemical plasticizers, retarders and activators reveals that some completely inhibit gel formation, others are without effect and some are promoters of gel formation. The derivatives of para-phenylene diamine are particularly effective gel inhibitors.

The presence of gel in SBR tire tread compounds has a radical effect on physical properties. Modulus increases materially, tensile strength decreases substantially and cut growth resistance decreases radically with an increase in gel content.

Careful attention to processing conditions and to the selection of compounding ingredients can result in improved styrene-butadiene rubber compounds.

10:40 A.M.—21A—Terpolymer Rubbers: Standardization of Infrared Analysis of Chemical and Radiotracer Methods. ***G. B. Sterling, J. G. Cobler, D. S. Erley and F. A. Blanchard (Dow Chemical Co., Midland, Mich.). (Paper will be presented by Mr. Sterling).***

Considerable interest has developed recently in tailoring polymeric materials for specific end uses. Such tailoring is accomplished by copolymerizing two or more monomers in definite proportions. The physical properties exhibited by the synthetic polymers depend to a large extent on exact polymer composition which generally differs from the monomer charge ratio. Consequently considerable effort has been devoted to methods for the analysis of such products.

Infrared spectroscopy has proved particularly useful in this work as it is rapid, specific, and accurate, but samples of known composition are required as standards for quantitative work. The present paper describes a novel approach to the development of an infrared method for determining the composition of one of these tailored products: a terpolymer rubber of methyl isopropenyl ketone (MIK), butadiene and acrylonitrile (VCN). The method could be readily used on many products of this type.

The infrared spectrum obtained from a film cast from the latex shows the expected absorptions of VCN, MIK, and butadiene. Since each of these absorption bands is free of interference from other components, the terpolymer rubber composition might be determined from the infrared spectrum if standards of known composition could be obtained.

Chemical analysis alone was found to give erratic results, therefore, special standard latex samples were prepared using MIK-C^{14}. These were analyzed chemically for VCN, and by radio-tracer analysis for MIK to give the data necessary for standardizing the infrared method.

This paper describes the preparation of MIK-C^{14}, the terpolymer rubber standards, the procedures used to analyze the standards, and the development of the final infrared spectroscopic method.

11:00 A.M.—22A—A High Temperature, Fluid-Resistant Fluorocarbon Elastomer. *D. A. Stivers and F. J. Honn (Minnesota Mining & Manufacturing Co., St. Paul, Minn.). (Paper will be presented by Mr. Stivers).*

Elastomeric polymers which are resistant to solvents and functional fluids at high temperatures, especially above 400°F., meet many current needs in the aircraft, missile, automotive, and chemical industries. They are expected to play an even more vital role in designs of the future. Fluorel elastomer is a high strength fluorocarbon possessing a combination of resistance to heat and compression set in the presence of destructive fluids that makes it widely applicable in the temperature range of 400 to 600°F. These qualities are supplemented with tear strength, abrasion and ozone resistance, electrical and low temperature properties that give performance which in many ways is highly competitive with the lower priced non-fluorinated special purpose elastomers. The viscosity of gum and compounded stocks readily adapts it to modern rubber fabricating methods. General properties are described, and compounding techniques for obtaining optimum resistance in solvents, oils, acids, and functional fluids under conditions of high heat and compression are presented.

11:20 A.M.—23A—Fibrous Silicone Rubber. *R. A. Russell (Connecticut Hard Rubber Co., New Haven, Conn.).*

A new physical form of silicone rubber has been developed. This new form is a fibrous silicone rubber mat which offers improvements over usual sponged or foamed mats. Unlike open or closed cell expanded rubbers, the new material achieves its properties by a web-like arrangement of small hollow filaments bonded at their intersections.

A spray process by which fibrous silicone rubber mats can be produced in continuous lengths from a variety of commercially available silicone compounds is described and illustrated.

Physical properties of fibrous silicone rubbers are compared with those of conventional cellular rubbers to demonstrate how the properties are affected by the structure. Data illustrating the manner in which the fibrous structure results in the improvement of such properties as compression set, air permeability, strength and vibration absorption are presented. Potential applications of fibrous silicone rubber are discussed briefly.

11:40 A.M.—24A—A Study of Abrasion and Road Wear of Butyl Tires through Designed Compounding Experiments. *R. L. Zapp, C. W. Umland II (Enjay Laboratories, Linden, N. J.) and L. R. Sperberg (3-T Fleet, Inc., Odessa, Texas). (Paper will be presented by Mr. Umland).*

The study of the effect of compounding variables on the road wear of experimental butyl tires was facilitated by statistically designed laboratory compounding experiments. Because rubber compounds possess many variables, orthodox experiments which attempt to study one variable at a time result in an unwieldy number of experiments. When attempts are made to coordinate expensive road wear tests with orthodox experiments financial burdens may become excessive. However, if a certain variable asserts itself with statistical significance, in a simple designed experiment, limited road wear tests based upon these directions can be coordinated with laboratory experiments.

In these studies devoted to abrasion resistance and road wear, four ingredients of a tread compound were varied according to a Gracco Latin Square design. The effect of these ingredient variations upon laboratory abrasion resistance was observed using a Lambourn Abrader. From these experiments using one molecular weight level of butyl rubber (Enjay Butyl 218), it was concluded that:

(1) The most significant improvement in abrasion resistance could be obtained by reducing the sulfur content of the formulation. Reduction in sulfur level from 1.5 to 0.5 parts per 100 parts of polymer resulted in a 40% reduction in abrasion losses.

(2) To a less significant degree reduction in carbon black content from 60 to 40 parts of SAF black per 100 parts of polymer resulted in lower abrasion losses. Further reduction to 30 parts of SAF black produced no further reduction in abrasion losses.

(3) Variations in oil plasticizer content, and Elastopar, heat promoter, produced much less significant effects.

Butyl rubber tires of the same tread design and construction were then produced and tested for road wear at a seventy mile per hour sustained driving speed. Compounds following the dictates of the designed experiment indicated a road life improvement of 30% as the sulfur content was lowered from 1.5 to 0.75 to 0.5 parts per 100 of polymer. In general, these compound changes, that produced the improved road life, formed softer and more extensible vulcanizates.

Technical Session B

General Papers

A. J. Hawkins, Jr., Presiding

9:00 A.M.—16B—Room-Temperature Sulfur and Non-Sulfur Vulcanization of Natural Rubber. I. With Sulfur and Piperidinium N-Pentamethylenedithiocarbamate. II. With Quinone Dioxime (GMF) and Yellow Mecuric Oxide. *Harry L. Fisher (University of Southern California, Los Angeles, Calif.).*

I. Calendered slabs of pale crepe rubber containing an ultra-accelerator, piperidinium N-pentamethylenedithiocarbamate, and zinc oxide were embedded in powdered sulfur and kept at room temperature. Tensile strengths up to 294.2 kgs./sq.cm. (4185 lbs./sq.in.) were obtained; elongations were up to 530 per cent, and the combined sulfur in 115 weeks was 3.60 per cent.

II. Calendered pale crepe rubber containing ten parts of yellow mercuric oxide to 100 parts of rubber allowed to stand covered with quinone dioxime (GMF) powder at room temperature slowly vulcanizes, reaching a tensile strength of 53.1 kgs./sq.cm. (754 lbs./sq.in.) in 405 days, and retaining this condition for at least twice this same period of time. The elongation reached 740 per cent, and the set was 0.16.

The tensile strength obtained is almost as high as that obtained in a press cure with quinone dioxime alone.

The untreated sample containing yellow mercuric oxide alone showed a setup with only 5.3 kgs./sq.cm. (75 lbs./sq.in.) tensile strength.

Calendered pale crepe with no mercuric oxide set in quinone dioxime and calendered pale crepe containing two parts of quinone dioxime, each set standing at room temperature showed no signs of vulcanization.

9:20 A.M.—17B—Vulcanization with TMTD. *E. M. Bevilacqua (Research Center, United States Rubber Co., Wayne, N. J.).*

Certain simple stoichiometric requirements for obtaining the maximum yield of cross-linking during vulcanization with TMTD which have not been explicitly described previously are given. This information together with new analytical data on products formed during the reaction makes it possible to evaluate critically efforts which have been made to explain the high efficiency of TMTD "sulfurless" vulcanization. It is now possible to outline the mechanism within rather narrow limits although some details require further experimental study.

9:40 A.M.—18B—Sulfur Donor Vulcanization Systems Yield Improved Butyl Rubber Vulcanizates. *C. J. Jankowski, K. W. Powers and R. L. Zapp (Enjay Laboratories, Linden, N. J.). (Paper will be presented by Mr. Jankowski).*

Improved compression set, Goodrich Flexometer, and aging properties are obtained when a butyl rubber compound is vulcanized with sulfur donor systems such as morpholine disulfide or dibutyl xanthogen disulfide in conjunction with accelerators. Comparison of stress relaxation at elevated temperature and high temperature swelling indicate a different cross-link is obtained with a sulfur donor system than is obtained with an elemental sulfur system. Data indicate that the bond obtained from elemental sulfur opens at elevated temperature allowing the vulcanizate to deform under load and then closes when the temperature is decreased so that the deformed shape is maintained. The bond obtained with a sulfur donor system does not show this bond opening so that smaller permanent deformations under load are obtained.

The improved flexing performance and aging resistance of the sulfur donor vulcanizate are further manifestations of the stability of this type of cross-link and its resistance to chemical attack. Proposed structures for the bond obtained with sulfur donor systems are: (1) Dialkyl disulfide cross-link rather than dialkenyl disulfide cross-link, and (2) Dialkenyl monosulfide cross-link rather than dialkenyl disulfide cross-link.

10:00 A.M.—19B—Cardolite Brand NX-3256 and NX-3216 Resins for Curing Butyl Rubber for Heat-Resistant Applications. *F. A. Moller and D. A. Stivers (Minnesota Mining & Manufacturing Co., St. Paul, Minn.). (Paper will be presented by Mr. Stivers).*

For several years now, derivatives of para-substituted phenols have been known to cure butyl rubber in such a way as to raise the upper limit of heat resistance another 100°F. No mention was ever made of meta-substituted phenols performing this same task. However, it was discovered that a dimethylol derivative of the meta-substituted phenol which forms the major component of cashew nut shell liquid vulcanized butyl rubber producing many of the same properties obtained with their para-substituted forerunners.

This paper presents data on a solid meta-substituted resin, Cardolite NX-3216 Resin, that produces a high state of cure when used in conjunction with stannous chloride dihydrate as a catalyst. Heat-aged properties are comparable to those obtained with para-substituted phenols, but processing is more difficult due to a higher scorch rate. A technique to prevent scorch using a partially hydrolyzed form of stannous chloride dihydrate in conjunction with a small amount of a hydrogen halide donor, such as, sec. butyl chloride, is illustrated. The properties of a non-scorching liquid meta-substituted resin, Cardolite NX-3256 Resin, also exhibit good original and heat-aged properties when cured with a stannous chloride dihydrate catalyst.

10:20 A.M.—20B—Chemical-Loaded Molecular Sieves as Latent Curing Aids. III. A New Resin Curing System for Butyl Rubber. *F. M. O'Connor and R. L. Mays (Linde Co., Tonawanda, N. Y.). (Paper will be presented by Mr. O'Connor).*

The use of a heat-reactive dimethylol phenolic resin for the cross-linking of butyl rubber has been commonly referred to as the "resin cure" of butyl rubber. In order to obtain practical cure rates in this type of curing system, catalysts or accelerators have been used in conjunction with the phenolic resin. Materials such as heavy metal halides, chlorinated paraffin wax, halogenated elastomers or organic sulfonic acids have been the most common accelerators used. Some of these materials are so active that formulations containing them are difficult to process due to premature curing of the rubber, staining or sticking to processing equipment. Others are so inactive that recipes containing them must be cured at relatively high temperatures or for very long curing cycles at conventional temperatures.

The use of hydrogen chloride-loaded molecular sieve in conjunction with zinc oxide and polychloroprene in this type system offers very fast cure rates without the concomitant disadvantages normally encountered when active catalysts are used. It is possible by adjusting the ratio of hydrogen chloride-loaded molecular sieve, zinc oxide and polychloroprene to obtain the processing, curing and aging characteristics necessary to meet a wide variety of specifications.

This paper presents data which show the utility of this acceleration system in formulations used in the fabrication of tire curing bags. The versatility of this system should also offer advantages in formulations designed for many other applications.

10:40 A.M.—21B—The Influence of the Order of Addition of Compounding Ingredients on Stocks Milled at Elevated Temperatures. *H. C. Jones (New Jersey Zinc Co., Palmerton, Penna.).*

Emphasis on greater production rates through the utilization of high speed, high ram pressure mixing operations has resulted in discharge temperatures in excess of 300°F. for many rubber compounds. The curatives such as zinc oxide, accelerator and sulfur are reactive at the elevated temperature and the order of addition of these ingredients to the rubber batch can have a marked effect on the processability of the uncured compound and the quality of the finished article.

The laboratory scale experiments described in this paper indicate that early addition of zinc oxide improves the quality of the rubber compound and contributes to accelerator stability at the elevated mixing temperatures. Greater processing latitude is gained, however, by late addition of zinc oxide to the rubber batch.

The influence of milling order on the high temperature mixing of organic accelerators, notably thiurams and some sulfenamides, has a pronounced effect on the properties of the resultant compounds. Carbon black was a distinctive factor in these studies with furnace black behaving differently than channel. The investigation was based primarily on natural rubber together with several cold SBR stocks. Stress-strain, tear, pendulum rebound and Mooney scorch at 250°F. were the properties determined.

11:00 A.M.—22B—Mold Lag in Laboratory Rubber Sheet (Modulus) and Rebound Block Curing. *H. A. Freeman and S. D. Gehman (Goodyear Tire & Rubber Co., Akron, Ohio). (Paper will be presented by Mr. Freeman).*

Since modern accelerators give relatively fast cure to rubber compounds, it becomes increasingly important to properly evaluate the cure of laboratory test specimens where state of cure is concerned.

Modulus test sheets were cured at 260°F.—280°F.—300°F. and 320°F. according to standard ASTM practice. Precision timing and thermocouple determinations showed that mold heat lag at start of cure (because mold was out of press to load) was compensated for by "cooling" cure after the press starts to open. Therefore, no mold lag factor should be used in evaluating the total press sheet cure. For example, a specified sheet cure of 20 minutes at 260°F. gives the test piece an actual cure of 20 minutes at 260°F.

More mold lag occurs with heavier molds and thicker specimens than in the case of sheet cures. Rebound blocks 1 x 1 x 2 inches were thermocoupled at the center and at the outer surfaces. Considering both "in mold" and "cooling" or total cure, there is a net heat lag at the center of the block in a high black tread compound of eight minutes equivalent cure at the given temperature. For a pure gum

compound the net center heat lag is 11 minutes equivalent. The net "mold lag" at the top and bottom faces of the block is one minute, for this thicker mold, but more at the side faces. Rebound block cures in the laboratory should be governed accordingly. This problem was also studied by mathematical heat flow calculations. However, the thermocouple shows actual heat flow under standard cure conditions, and takes into account the total mold lag.

11:20 A.M.—23B—Development of Rubber-Based Insulation Materials for Solid Rocket Motors. ***O. D. Ratliff and H. J. McSpadden (Astrodyne, Inc., McGregor, Texas). (Paper will be presented by Mr. Ratliff).***

An insulator based on an asbestos-loaded rubber has been developed and tested in rocket motors with firing durations up to four minutes.

Comparative tests of rubber-based insulators versus commercially available insulators have been run subjecting the insulation materials to an oxygen-natural gas flame for twenty minutes. These tests have shown that during the first 60 seconds the rate of heat transfer through the rubber-based insulators is about one-third that of the better commercial insulators. After one minute the difference in rate of heat transfer becomes less marked.

After exposure to a natural gas-oxygen flame for twenty minutes, the best rubber-based insulator indicated a temperature of 785°F. on the back side of an 0.3-inch thick sample. A commercial phenolic-glass laminate insulator, after the same test, indicated a temperature of 1550°F.

Rocket motor evaluation of a rubber-based insulator was carried out in a ten-inch diameter case utilizing an end burning charge of a high energy metallized propellant. The maximum temperature recorded on the case wall was 300°F. after a firing duration of 244 seconds.

11:40 A.M.—24B—The Structure of Carbon Blacks. ***Andries Voet and William N. Whitten, Jr. (J. M. Huber Corp., Borger, Texas). (Paper will be presented by Mr. Voet).***

The structural involvement of a carbon black, whether dispersed in gases, liquids or elastomers, is the result of an interplay of attractive and repulsive forces between individual particles. The present investigation employs a recently developed electrical approach, by means of conductivity and dielectric constant measurements, for the study of the structure of an extensive series of commercial and experimental blacks dispersed in a white mineral oil at several concentrations and temperatures, while subject to varying rates of shear.

Differences in electrical conductivities have been found between quiescent and sheared dispersions varying from none up to six orders of magnitude. Equally, large differences in the rates of conductivity changes resulting from shear rate changes were observed, allowing conclusions about magnitude and rate of structure formation in blacks.

A minimum was found in the conductivity-shear rate relationship for all blacks, indicative of the forces required for mechanical structure elimination. An induction period for reformation of the structure was observed varying from less than one to several hundreds of seconds, dependent upon the type of black.

It appears that a system of classification of the structural characteristics of carbon blacks is possible on the basis of the degree and rate of structure build-up and the inherent resistance to deflocculation. The application of potential energy curves to analyze structural phenomena contributes greatly to a more basic understanding of the extreme differences in structural behavior of different types of black.

A correlation appears to exist between the structure and the specific plastic viscosity of the carbon black dispersions as measured in a high shear rotational viscometer.

Los Angeles, California

EDITORIAL

Matter for Concern

► Within the past few months the news columns of this journal have carried two relatively small items concerning molded goods plants. One was the shut-down of its Fort Wayne, Indiana plant by U. S. Rubber and the other was the shut-down of its Cadillac, Michigan plant by Goodrich. In both cases the primary reason for the shut-downs was that the plants were losing money.

Although the news items have been referred to above as relatively small, the news-behind-the-news is relatively big. It indicates that productivity is not keeping pace with rising wage costs, especially where union contracts apply in the rubber industry. The smaller molded goods manufacturers, including the few which are still not unionized, have been able to underbid the giants in a countless number of cases.

One of the peculiarities which exists in these shut-downs is that both the U. S. Rubber and Goodrich plants were equipped with the latest type of molding equipment, the management was of the best, and the respective sales forces adequate. Yet the smaller molders, with their flexibility of movement and their ability to squeeze profit margins, have been able to consistently take orders away freely. They have been able to undercut by margins of 50 per cent or more in many instances.

There is no gainsaying the fact that employment costs, which include both wages and fringe benefits, were largely responsible for the decisions in the two cases under discussion. There were, of course, other factors involved. For instance, both the Fort Wayne and Cadillac plants were heavily dependent on the automotive industry which, to say the least, has been somewhat undependable in the past few years. The net operating loss at the Cadillac plant for 1958 was some $300,000.

But the crux of the situation seems to lie in employment terms laid down by the United Rubber Workers where the Big Four is concerned. The URW has long insisted on across-the-board settlements, i.e., the same type of wage and fringe benefit settlement in all plants of the Big Four without regard to the specific type of products made at the various plants. Since the smaller unionized molded goods plants are frequently able to secure more reasonable settlements, the cost factor continues to grow in favor of the latter companies with each new negotiated contract.

It might be argued that in the final analysis some rubber manufacturer will secure the business and some union rubber worker will receive full pay for his services. But this is small consolation to URW members in Fort Wayne or Cadillac. And in a sense it is small consolation to the rubber manufacturing industry. Or even to the United Rubber Workers. Granted that it is an ill wind that blows no good, the loss of any plant in the industry is felt up and down the line.

We freely admit that the basic job of labor leaders is to gain maximum benefits for their members in terms of wages and fringe benefits. They would not merit their positions if their goals were less. But even in industry there is a point of no return and with new negotiations coming up shortly with the Big Four, perhaps it is time for the leaders of the rubber union to do a little soul searching.

Special Industry Report

Equipment Leasing

in the Rubber Industry

THE LEASING of equipment rather than purchase is becoming an increasingly widespread practice in industry, and many rubber and rubber goods manufacturers are finding it an advantageous method of not only replacing out-of-date machinery, but also for expanding their operations. In order to get the pertinent information on this way of financing, the editors of RUBBER AGE recently asked Robert Sheridan, president of Nationwide Leasing Co., which is one of leading firms engaged in equipment leasing, about various aspects of the subject. What he had to say follows.

QUESTION: What is the volume of equipment leasing in the rubber industry?

ANSWER: At the end of December, 1958, there was approximately $3 million worth of production equipment on long-term lease in the rubber and rubber products industries. Most of this dollar volume has been put on the books in the past two years, when rubber producers first began showing an interest in equipment leasing.

Major reasons for the growth of leasing in the rubber industry are: (1) the increasing tightness of working capital in the industry, (2) the need to expand production to keep pace with the increasing market for rubber and rubber products, and (3) the increasing cost of equipment. Development of the domestic synthetic rubber industry has resulted in opening huge new markets for rubber products. Manufacturers have increased plant capacity, spending approximately $1 billion in the past five years, and strained working capital resources to the tightest point in the industry's history. Leasing has helped ease the pinch.

QUESTION: What is the volume of equipment leasing by U. S. industry?

ANSWER: In December, 1958, there was approximately $227 million worth of production equipment on long-term lease throughout U.S. industry.

QUESTION: What is equipment leasing?

ANSWER: Equipment leasing is a method of obtaining the use of income-producing equipment (fixed assets) without capital investment. When equipment is obtained in this way for use in production, the units remain the property of the leasing company, but are used by the lessee, who pays the leasing company a fixed charge for a stated period of using the equipment. Leasing is a long-term arrangement, normally from 3 to 10 years, though in some cases it may be as little as two years or as long as 15 years. It is different from equipment rental, which is a short-term affair, in which the rental firm rents out new or used pieces for a brief period, reclaims them at the end of the period, and then rents the equipment to other users.

QUESTION: Why has equipment leasing increased so rapidly?

ANSWER: Basically, equipment leasing has increased as a result of the steadily increasing cost of capital equipment. Leasing has historically been a means of permitting businessmen to function without owning everything they need to do business, since profits are made by using capital equipment, rather than by owning it. Specific reasons for the current growth of equipment leasing are:

(1) Profit-producing equipment is put to work without capital investment. This is particularly important since working capital remains tight, despite the slight improvement resulting from inventory liquidation.

(2) Risk of loss caused by rapid obsolescence of specialized equipment is reduced.

(3) Equipment can be obtained for limited-term use, either for special orders or for developmental or research work. This is particularly important where firms are involved in defense contract work.

(4) For manufacturers of industrial equipment, leasing programs have proved to be an effective method of increasing sales.

QUESTION: How does equipment leasing work?

ANSWER: A company which wishes to lease equipment from such organizations as, for example, Nationwide Leasing Co., submits an application describing itself—its business, its financial position, etc. It lists the specific manufacturer from whom it wishes to secure the equipment, the price of the equipment, the length of the lease terms it wants, and the form of payment it desires. The leasing company then purchases the equipment and arranges for its shipment directly to the lessee's plant or store. Upon acceptance of the equipment, payments start. All equipment, no matter how many items are involved, can be covered by a single master lease and can be paid for in a single monthly payment. Since this is true regardless of how many suppliers are involved, it reduces the user's bookkeeping considerably.

QUESTION: What types of equipment are leased?

ANSWER: All types. In 1958, equipment leased ranged in cost from a $17 hand truck (part of a $140,000 equipment lease with a midwestern hospital) to $5,000,000 worth of construction equipment. Both standard and specially-built units can be leased.

QUESTION: What are the other advantages of leasing?

ANSWER: Other advantages to users of leased equipment, in addition to those cited above, lie in how leasing improves a company's financial position:

(1) Leasing offers financing without dilution of ownership or control.

(2) In leasing, there is no necessity for a periodic cleanup of funds or a pledge of receivables.

(3) Leasing may offer certain tax-timing advantages in specific instances.

(4) Leasing makes for a cleaner balance sheet. Only the lease payments due within 12 months appear on the balance sheet thus affecting the ratio of current assets to current debt very little. As a result, a company is able to use its established lines of credit for short-term borrowing without disturbance.

QUESTION: What types of companies lease equipment?

ANSWER: All types of companies in virtually every industry lease equip-

ment. They range in size from quite small ones (restaurants and motels, for example) to giant companies in the billion-dollar-a-year sales category. According to an annual survey made by Nationwide Leasing Company, the ten leading industries using leased equipment in 1958 were nine manufacturing ones and the supermarket industry.

QUESTION: What is the length of equipment lease terms?

ANSWER: Terms generally range from 3 to 10 years or longer, though in some cases, where smaller sums are involved, they can be as little as two years. The user determines the length of lease he prefers, and arranges the payments to suit his own needs. Leases are usually written on a uniform payment basis, although they can be written on straight line, declining balance, sum of the digits, or any schedule preferred by the user.

QUESTION: Is equipment leasing useful as a sales tool for manufacturers of production equipment?

ANSWER: In a number of industries, leasing programs have proved to be an effective method of increasing sales, through offering customers the option of purchase or lease—with the leasing company assuming the lease contract and paying the manufacturer 100 per cent cash for the equipment when the equipment is delivered. Nationwide Leasing Co., the leading specialist in this particular leasing field, sets up a complete sales training program for the manufacturer so that his leasing plan will have maximum impact.

In merchandising-leasing plans, leasing is used as a primary sales tool, giving the manufacturer's salesmen an important new way to move goods. The customer has the benefit of the lease —the manufacturer has a cash sale. Not only does this normally enable a manufacturer to increase his sales by the added leasing volume, but the interest generated around the leasing plan results in opening new markets for the product and inevitably results in increased direct sales, often greater than the leasing volume.

QUESTION: How does leasing compare with other financing methods?

ANSWER: Leasing offers 100 per cent financing and provides the rubber company with greater cash flow than any other financing method. As a result, the relative cost of leasing is less than other methods. Any expenditure of money to acquire new equipment involves paying something for the use of the money. Even in the case of outright cash purchase, the rubber manufacturer is sacrificing the earnings his working cash would yield; this, in effect, is what he is "paying" for the use of his own money. In the rubber and rubber products industry this means a "cost" of 34 per cent—the average *before-tax* rate of profit on net working capital the industry has earned.

Leasing frees more working capital immediately than any other method of obtaining equipment. This cash excess earns profits for the company at the company's normal rate for the life of the lease. Over the term of the lease the additional profits produced by this cash excess will be so great that the relative cost of leasing will be lower than other financing methods. (A complete analysis of the comparative cost of leasing and other financing methods has been developed by the Foundation for Management Research. It is entitled: "Lease or Buy? Comparative Costs of Equipment Acquisition." Those wishing to obtain single free copies of this report should write directly to the Foundation at 121 West Adams St., Chicago 3, Ill.)

QUESTION: What are recent trends in leasing?

ANSWER: Two new trends have shown themselves: (1) the sale-leaseback transaction (commonly, but erroneously, termed purchase-leaseback) and (2) merchandising-leasing plans involving the cooperation of equipment manufacturers and a leasing company to increase sales.

In the sale-leaseback transaction, a company builds a new plant, sells the equipment and facilities to the leasing company as soon as it is completed and ready for use, and immediately leases it back. Often this is done with older plants also. This enables firms whose financial ratios would not otherwise permit them to expand at so great a rate, to do so without straining their capital structure.

QUESTION: What operating situations make leasing most advantageous?

ANSWER: Leasing is most advantageous under the following circumstances:

(1) In general, where companies can expand their operations profitably, if additional equipment and machinery were made available at smaller annual expense than through use of their own capital.

(2) Companies which find themselves short of working capital but which have sufficient equipment, can remedy the situation through sale-leaseback transactions.

(3) Companies faced with competition that is using the latest equipment, while they themselves lag on cost-saving. In this situation, acquiring the new equipment is essential, but often a large initial cost is prohibitive. Leasing can often provide the solution.

(4) Companies which hold a tight check rein on capital expenditures and financial ratios. Leasing permits the management of these companies to secure new equipment without forcing the board of directors to raise more capital.

(5) Where rapid obsolescence is a strong possibility, leasing by-passes the problem of capital investment in such equipment.

(6) For pilot plants, developmental or experimental projects, leasing offers a means of opening new areas of production without draining working capital on such unproved ventures.

(7) Companies engaged in defense contract work are often enabled, through leasing, to obtain needed equipment for the term of the contract. In this way capital is not frozen in equipment which may not be useful after the contract has been fulfilled.

QUESTION: Do leasing agreements contain purchase options?

ANSWER: Yes, leasing agreements can contain purchase options. However, Nationwide Leasing Co. advises against including purchase options in the leasing agreement. The reason is that a purchase option generally converts a leasing agreement into a conditional sales contract in the eyes of the Internal Revenue Department. There are some exceptions to this general rule, but these exceptions are uncertain and depend on specific rulings by the Internal Revenue Department at the conclusion of the contract, many years later. For this reason, purchase options are not recommended. True lease payments, as differentiated from disguised conditional sales contract payments, are legitimate deductions as operating expenses. Conditional sales contracts are deductible only at the rate specified in the federal government's depreciation schedules.

QUESTION: Do leasing contracts contain renewal options?

ANSWER: Yes. In leasing, the cost of the equipment is paid for entirely in the original leasing term. Renewal options are usually available at extremely low cost. They can range in length from one-year options to indefinite terms.

QUESTION: How can I tell if my company should lease or buy?

ANSWER: There is no method of financing that fits every situation equally. Factors to be judged include the availability of working capital, the rate of profit the company earns on its working capital, the effect of leasing on the company's cash flow as compared with other financing methods, the company's competitive situation, and whether there are any tax advantages in the company's special situation.

Expert advice never hurts. Readers may obtain an analysis of their situation, without obligation, by writing to such organizations as Nationwide Leasing Co., 11 South LaSalle Street, Chicago 3, Illinois.

News Reports

and Industry Activities

APRIL, 1959

U. S. Rubber Announces Production of Polyisoprene Truck Tires

Shell Chemical Manufacturing and Marketing New Synthetic

► U. S. Rubber Co., New York, N. Y., has begun the production of truck tires made from polyisoprene rubber manufactured by the Shell Chemical Corp. and sold at a price that is competitive with that of the natural product. Production of polyisoprene truck tires in the 7.50-20 size began at U. S. Rubber's Los Angeles plant on March 2. As the supply of the new synthetic increases, the company expects to expand production to additional truck tire sizes; off the road tires; aircraft tires; white side-wall passenger tires; and other products which now require natural rubber.

Shell Chemical will manufacture and sell the new material under the trade name "Shell Isoprene Rubber". Currently, polyisoprene is being produced by part-time utilization of commercial equipment located at various Shell Chemical and Shell Oil installations in the Los Angeles area. Output will be maintained at a rate averaging five tons a day in order to furnish a supply for U. S. Rubber's current usage and for other customer evaluations. As installation of various additions to plant progresses during the year, the effective capacity is expected to increase to from 15,000 to 20,000 tons annually on a steady basis.

Duplicates Natural

Polyisoprene rubber is said to be a duplicate of the best grade of natural rubber. Since it is made by a chemically-controlled process, the company states, it is much more uniform in quality and of higher purity than plantation rubber which is a mixture from different trees or different plantations. Although several companies have announced the synthesis of polyisoprene in recent years, it has not been produced commercially because of doubt that it could compete with natural. Shell scientists have developed a new chain of production processes which enable the company to compete. The current price of Shell Isoprene Rubber is 30c per pound f.o.b. Torrance, Calif., approximately equivalent to that for the better grades of the natural product.

U. S. Rubber has adopted and expects to extend the use of polyisoprene rubber as rapidly as its production will permit. Scientists in the company's Tire Development Laboratory in Detroit have developed new compounding techniques and a special process for the new synthetic which are said to shorten its curing time, give it better adhesion and adapt it to normal tire building operations. As a result, tires made of the new rubber have more uniform quality than those made with natural, the company states.

According to U. S. Rubber, the new polymer has been thoroughly tested in the laboratory and on the road, where truck tires made from it have proved to be equal, and in some cases, superior to those made with natural rubber. Further refinements and modifications are expected to increase its quality lead. Production economies in the use of polyisoprene have also been discovered and new compounding techniques introduced with the result that the new rubber is easier to process than natural.

U. S. Rubber believes that there will be many ready markets awaiting the new polymer. It is expected to find application in the production of huge tires for earth-moving equipment and aircraft tires, where plantation rubber is now used almost exclusively. It is also expected to be used in white sidewall passenger tires where a costly, high grade of natural rubber is now used. It is believed that the footwear industry, which uses great quantities of pale crepe, will provide another ready market along with the surgical glove and other rubber sundries industries.

Because of its superiority to existing

First tire out of the mold at U. S. Rubber's Los Angeles plant. Left to right are Ben S. Adams and D. W. Walsh (U. S. Rubber), and J. P. Cunningham (Shell).

A reactor for polyisoprene production at Shell's Emeryville research center.

synthetic rubbers in certain characteristics, natural rubber has until now enjoyed a virtual monopoly in many applications. Large truck tires are an example of this. In contrast to passenger car tires which carry lighter loads and generate less heat and are made mostly of GR-S synthetic rubber, large truck tires are still made of natural rubber because their heavy loads and heat build up, demand the tougher, cooler running natural product.

Kelly Retires from Bell

► Bell Telephone Laboratories, New York, N. Y., has announced the retirement of Dr. Mervin J. Kelly, chairman of the board of directors, after 41 years of service. Dr. Kelly received his B.S. degree from the Missouri School of Mines and Metallurgy in 1914, his M.S. degree from the University of Kentucky in 1915, and his Ph.D. from the University of Chicago in 1918. He began his Bell System career in 1918 as a research physicist with the Research Division of Western Electric's Engineering Department. His early work was in the areas of thermionic emission, gaseous discharge phenomena and electron dynamics and, later, applications of acoustics in telephony.

Dr. Kelly served as director of vacuum tube development and as development director of transmission instruments and electronics before being named director of research in 1936. He became executive vice-president of the laboratories in 1944, president in 1951, and chairman of the board in January, 1959. Dr. Kelly is chairman of a National Academy of Science committee, and of the Statutory Visiting Committee of the National Bureau of Standards. He is a life member of the Massachusetts Institute of Technology Corp., and a member of its executive committee; a trustee of Stevens Institute of Technology; and serves on advisory committees at M.I.T., New York University, Case Institute of Technology, Columbia University, and the New York City Board of Education.

Allied Develops Plasticizers

► Two new polymeric plasticizers have been developed by Plastics & Coal Chemicals Division, Allied Chemical Corp., New York, N. Y. The plasticizers, "Elastex 37-R" and "Elastex 36-R", according to the company, are characterized by their extreme durability as primary agents or in blends with monomeric-type plasticizers, and they lend themselves to adaptations more readily than earlier polymeric types. Allied reports that Elastex 37-R is a high molecular weight material specifically designed for vinyl compounding. The resin compounds, the company states, retain their original properties at high temperatures and are unaffected by kerosene, oil and soapy water. Because of these characteristics, the company claims, 37-R is expected to find application in cable jackets, paper coatings, refrigerator gaskets, high-temperature and high-humidity resistant insulation and high-grade upholstery sheeting.

Elastex 36-R is a medium molecular weight material developed for more general use, reports Allied. It exhibits excellent durability as well as superior handling and processing properties when compounded with nitrile elastomers, according to Allied, and it has an outstanding ability to resist extraction by aliphatic and aromatic hydrocarbons. Allied recommends its use in upholstery sheeting, coated fabric, wall cocering, electrical tape, high temperature wire insulation and window channeling.

U. S. Rubber Plans Automation

► H. E. Humphreys, Jr., chairman of U. S. Rubber Co., New York, N. Y., in an address to the New York Society of Security Analysts predicted that U. S. Rubber will increase the use of automation in tire production. In his progress report on automation, Mr. Humphreys stated that U. S. Rubber has completed development of equipment for the continuous flow and automatic feed of components from the curing operation to the finished product, and efforts are now being made to apply automation to earlier steps in the process of building tires. He said, "When this program is completed, we shall be able to reduce the time required to process a passenger tire from 48 hours to less than 4 hours, and that covers the time the raw rubber is fed into the process until the finished tire comes out."

NRM Names Senn and Turk

► National Rubber Machinery Co., Akron, Ohio, has announced that Richard K. Senn has been named manager of extruder sales, while L. G. Turk was made operating manager of the Extruder Sales Division. Mr. Senn attended Ohio State University and Ohio University. He formerly was a project engineer at Hale & Kullgren, and earlier had been employed by Goodyear Tire & Rubber Co. Mr. Turk, a graduate of Carnegie Tech., was formerly associated with the Firestone Tire & Rubber Co.

Seiberling Expands Plastics Division

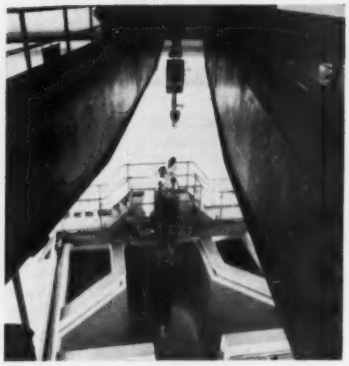
► Seiberling Rubber Co., Akron, Ohio, has announced that its plastics division at Newcomerstown, which was established in 1955, will be expanded. Construction has already begun on a new plant addition that will provide 20,000 square feet of new production space, laboratories and office area. The building is scheduled for completion this spring. With the added space and equipment to be installed, the plant's capacity will be greatly increased. Seiberling plans to expand production of present lines and also to add new products. The company's present goal is to double the division's sales within the next three years. The Newcomerstown plant was organized in 1953 as the first major diversification project undertaken by the firm since World War II. Ground was browen in 1954 and actual production started in 1955.

IRL Starts Operations at 5 Million Watt Reactor

► Industrial Reactor Laboratories, Inc., Plainsboro, N. J., an organization owned by ten of the nation's leading industrial companies, has begun operations at its new five million watt research reactor. IRL participants are the U. S. Rubber Co.; American Machine and Foundry Co.; American Tobacco Co.; Atlas Powder Co.; Continental Can Co.; Corning Glass Works; National Distillers and Chemical Corp.; National Lead Co.; Radio Corp. of America; and the Socony Mobil Oil Co., Inc.

The Industrial Reactor Laboratories center is situated on a 300 acre site in a rural area about five miles east of Princeton, N. J., and includes the reactor, adjoining laboratories and offices, and a pumping plant for the large capacity pumps that supply water for the reactor. The facility was constructed at a cost of $4,500,000, and was erected by the companies to provide them with a new tool for basic and applied research in their respective fields.

The "swimming pool" type nuclear research reactor, said to be the world's largest entirely owned and operated by private industry, was put into operation on January 21 as scientists brought together a sufficient amount of highly enriched uranium fuel to start a controlled chain reaction. Power will be raised gradually to its full potential of five million watts. Following a series of tests and measurements, the participating companies will start using the reactor in support of their individual research programs.



IRL reactor "swimming pool" at the bottom of which is the uranium core.

The reactor is housed in an 87 foot high aluminum sheathed "beehive" of reinforced concrete and consists of a special concrete pool rising 30 feet from ground level within the dome. The core of uranium fuel is situated at the bottom of the pool, where circulating water provides additional shielding and removes heat from the nuclear reaction. A platform around the top of the pool accommodates the reactor control room and provides working space for various operations. Around the base of the pool are numerous facilities for experimental work. Adjoining this building is an arrangement of shielded rooms for the remote handling and temporary storage of radioactive materials. In the building adjoining the reactor and the special shielded rooms are individual laboratories for the ten participating companies.

Detroit Group Hears Spalding On Nitrile Silicone Rubber

► The Detroit Rubber and Plastics Group held a meeting on February 6 at the Detroit Leland Hotel, Detroit, Mich., which was attended by over 200 members and guests. A pre-dinner meeting was devoted to a technical presentation on "Nitrile Silicone Rubber" by Dr. David P. Spalding of the Silicone Products Department of General Electric Co. An after-dinner address was given by Prof. Hubert N. Alyea, of the Department of Chemistry at Princeton University, whose topic was "Fission and Fusion: Weapons for Peace."

Dr. Spalding reviewed some of the chemical and physical problems encountered in developing oil and solvent resistant, high temperature nitrile silicone rubbers. He reported that the new elastomers are useful over the entire —100°F. to +500°F. temperature range of regular silicone rubber. Processing methods, physical properties of the new polymer, and potential automotive applications for nitrile silicone rubbers were included in Dr. Spalding's presentation.

Professor Alyea traced the growth of ideas which led to the tapping of nuclear energy for war and peace. He discussed the reactions in atomic bombs and nuclear reactors, and the production of radioisotopes for peace-time use. Professor Alyea's talk was profusely illustrated with lecture demonstrations.

New Company Formed

► A new company, Engineered Materials, 509 Fifth Avenue, New York, N. Y., has been formed to supply industrial raw materials of special properties and qualities to the rubber, ceramic, ferrite, powdered metals, plastics, cosmetic and pharmaceutical fields, According to the company, chemicals, non-metallic minerals and select metals may be obtained in powdered form, which covers the largest percentage of shipments. Liquids for density determination up to 6.0 and optical pyrometers are also obtainable, the company states. The company also announced that Alice Josephine Gitter has been named president.

Miss Gitter was graduated from Ohio State University in 1934 with a B.S. degree in ceramic engineering, becoming the first graduate woman ceramic engineer in the United States. She has worked as a ceramic engineer for a number of industrial companies and during World War II served as chief of the Clay-Talc Unit of the War Production Board. Prior to becoming president of Engineered Materials, she worked in market research and advertising. Miss Gitter is a member of the American Ceramic Society, Institute of Ceramic Engineers, Ohio Ceramic Industries Association and Canadian Ceramic Industries Association.

ASTM to Organize New Division

► American Society for Testing Materials, Philadelphia, Penna., plans to establish a new division on materials sciences to coordinate and intensify the development of knowledge of the fundamentals of materials. The new division, the first to be established by ASTM, will augment the depth and scope of the Society's long-time objective to promote knowledge of engineering materials and to tap new sources of knowledge for the Society's extensive standardization activities. The division will collect, establish and publish basic information essential for the creation of a better understanding of materials and their properties.

Four officers have been named to develop the division including, *President*, K. B. Woods (Purdue University); *Vice-Presidents*, F. L. LaQue (International Nickel) and A. Allan Bates (Portland Cement); and *Executive Secretary*, Robert J. Painter. This recommendation for a new division is one of several initiated by the ASTM Long-Range Planning Committee.

Johnson Granted Patent

► U. S. Rubber Reclaiming Co., Inc., Buffalo, N. Y., has announced that U. S. Patent No. 2,871,774, covering a new use for rubber, has been granted to Thomas A. Johnson, a research chemist with the company. The invention, which has been assigned to the company, related to a method of binding together rubber pellets with asphalt in order to produce a soft permanent surface for playground, tennis courts and similar areas. The product, according to the company, can withstand all weather conditions.

Witco Acquires Canadian Firm

► Witco Chemical Co., Inc., New York, N. Y., has purchased a controlling interest in P. N. Soden & Co., Ltd., a Canadian chemical distributing firm, current reports state. The purchase, which amounts to 85 per cent of Soden stock, will reportedly enable the company to further expand its chemical sales and manufacturing activities in Canada.

From here

to here

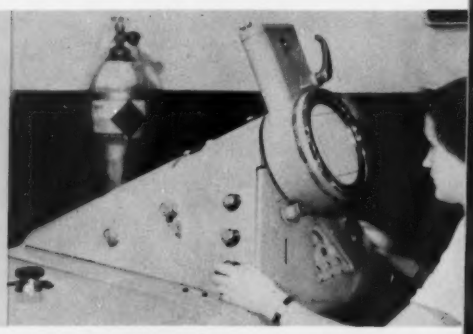
Furnex® SRF means optimum balance all the way!

TURN PAGE

Because COLUMBIAN goes all the way

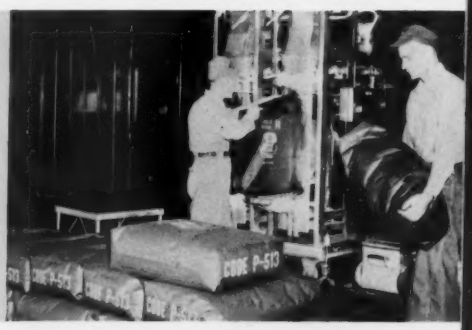
in RESEARCH .....

Columbian's laboratories have developed many "firsts" in the endless search to make carbon blacks that meet the most exacting specifications. Typical is Columbian's contribution in determining the micromorphology of carbon-reinforced rubber. The *first* electron microscope in North America was built by Columbian to see and measure the size of carbon black particles . . . leading to an entirely new concept of structure—a major tool today in carbon black evaluation.



in PRODUCTION .....

Columbian has pioneered many new methods of precise production control . . . to provide uniformity bag after bag, carload after carload. In addition, Columbian offers a wide range of blacks to match any requirement where rubber with special characteristics is desired . . . a range of blacks that assures superior results in end products.



in TECHNICAL SERVICE

For years, Columbian's Technical Service has been considered outstanding in the industry . . . is always available to study any phase of production . . . to contribute workable, practical ideas that can lead to greater economy, efficiency and improved products. Backed by the most modern laboratories and unequaled field experience, Columbian's Technical Service is a potent reason for specifying Columbian carbon blacks!

Columbian has a carbon black for every need . . .

STATEX®-160 SAF Super Abrasion Furnace
STATEX-125 ISAF Intermediate Super Abrasion Furnace
STATEX-R HAF High Abrasion Furnace
STANDARD MICRONEX® MPC Medium Processing Channel
MICRONEX W-6 EPC Easy Processing Channel
STATEX®-B FF Fine Furnace
STATEX-M FEF Fast Extruding Furnace
STATEX-93 HMF High Modulus Furnace
STATEX-G GPF General Purpose Furnace
FURNEX® SRF Semi-Reinforcing Furnace

COLUMBIAN CARBON COMPANY
380 MADISON AVENUE, NEW YORK 17, N. Y.
Branch offices and agents in principal cities

John C. Blackwood

Appointed Representative

► National Polychemicals, Inc., Wilmington, Mass., has announced the appointment of John C. Blackwood to its executive sales staff. Mr. Blackwood is a graduate of Boston College, as well as the Harvard Business School. He was formerly associated with B. B. Chemical Co. and the United Shoe Machinery Corp., where he was primarily concerned with market research. Prior to that, he had been associated with Tennessee Eastman Corp., Hercules Powder Co. and Nashua Mfg. Co. He is a member of the American Chemical Society and the Chemical Market Research Association.

Radcliff Talks in London

► Robert R. Radcliff of the Elastomers Laboratory of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., stated, in a paper presented on March 10 to the London Section of the Institution of the Rubber Industry, that DuPont has developed a curing agent especially for Viton synthetic rubber, and the first latex of Viton. He discussed the properties of the two materials, explaining that vulcanizates made with the curing agent have the same properties of outstanding temperatures and chemical resistance as those obtained from previously used chemicals.

According to Mr. Radcliff, the new curing agent, being marketed as "LD-214," is expected to provide a method for curing thick sections of Viton without sponging, and to provide parts with improved adhesion. The new storage-stable latex of Viton synthetic rubber, "LD-242," now available for commercial evaluation, shows promise in asbestos sheet, he stated. Unlike material bonded with ordinary rubbers, asbestos saturated with this product retains its flexibility and tensile strength after exposure to high temperatures and many chemicals such as aliphatic and aromatic hydrocarbons, concentrated acids and bases, oxidizing chemicals and chlorinated hydrocarbons, Mr. Radcliff concluded.

Charges Rubber Belting Price-Fix

► A Federal Grand Jury in New York City has indicted ten rubber manufacturers and a trade group for conspiracy in fixing prices of conveyor and power transmitting rubber belting under the Sherman Anti-Trust Act. For the last ten years, it states, the firms have fixed uniform prices and conditions of sales of flat rubber belting and by doing so, deprived buyers of a free and competitive market. The indictment charges one count of violation against each firm and also claims that the companies named manufacture more than 95 per cent of the flat belting made in this country. Their annual dollar volume of sales of the belting, it says, is about $65 million.

Named as defendants were the Rubber Manufacturers Association, Inc., New York, N. Y.; B. F. Goodrich Co. and Goodyear Tire and Rubber Co., Akron, Ohio; U. S. Rubber Co. and New York Rubber Corp., New York, N. Y.; H. K. Porter Co., Pittsburgh, Penna.; American Biltrite Rubber Co., Inc., Chelsea, Mass.; Hewitt-Robins, Inc., Stamford, Conn.; Raybestos-Manhattan, Inc., Passaic, N. J.; Acme-Hamilton Manufacturing Corp., Trenton, N. J.; and Lee Rubber and Tire Corp., Conshohocken, Penna. If convicted, each of the defendants could be fined up to $50,000.

Two of the firms, Goodyear and Goodrich, expressed surprise in response to the charge. Goodrich said, "We were surprised to learn of the Grand Jury's action in view of the severe competition and lack of price uniformity existing in the conveyor belt segment of the rubber industry for many years." Although Goodyear said no specific comment could be made until a copy of the indictment was received, it too, found the action "difficult to understand," according to current reports.

Sohio Plans Acrylonitrile Unit

► Sohio Chemical Co., Cleveland, Ohio, plans to construct an acrylonitrile plant at Lima, Ohio, which will be based on a process developed in the Sohio Research Center. The process stems from a research program directed toward the oxidation of olefins and is said to be the first commercial process for acrylonitrile starting with propylene as a raw material. Since concentrations of propylene are not too critical, a typical propane-propylene refinery stream is considered quite satisfactory. The only other raw material required is ammonia. Sohio reports that the process has been explored in pilot plant production and samples have been evaluated by fiber, rubber, plastics and chemicals manufacturers. Acrylonitrile produced by this method is fiber grade and does not have any of the major impurities which are typical of the acetylene or ethylene routes, the company claims.

David L. Matthews

Named by Goodrich-Gulf

► Goodrich-Gulf Chemicals, Inc., Cleveland, Ohio, has announced the appointment of David L. Matthews, formerly chief engineer, as its manager of manufacturing. Mr. Matthews was graduated from Iowa State College in 1935 with a B.S. degree in mechanical engineering. Prior to joining B. F. Goodrich in 1940 as a maintenance engineer, he worked for U. S. Gypsum Co. In 1941 he was named construction engineer and was assigned to the supervision of the building of a polyvinyl chloride plant at Louisville, Ky., of which he became plant engineer. In 1951, he became plant manager of the general chemicals plant of B. F. Goodrich Chemical Co. at Avon Lake, Ohio, and in 1954, he went to England to supervise a polyvinyl chloride plant expansion. He resumed his duties as plant manager at Avon Lake in 1955. Mr. Matthews is a member of the American Institute of Chemical Engineers, Professional Engineers Association and Cleveland Engineering Society.

Century Changes Name

► Century Products Co., Detroit, Mich., has formally changed the firm's name to Century Dispersions, Inc., in order to more accurately describe the products manufactured. The company produces color dispersions in chip form and pastes; synthetic and natural rubbers in various solvents for paint makers, and for coloring plastic extrusions; and color concentrates for vinyl and polyethylene wire insulations, at the extruders.

Ripple Sole Grants License

► Ripple Sole Corp., Detroit, Mich., has granted to Sussex Rubber Co., London, England, exclusive license to manufacture and sell resilient rubber soles in Great Britain and Ireland under its patents. It is reported that the soles will be marketed by Sussex under the name "Billow," and a full-scale marketing and promotion campaign is being planned.

New York Rubber Group Holds Spring Meeting

► The New York Rubber Group held its Spring Meeting on March 20, at the Henry Hudson Hotel in New York City, with over 200 members in attendance at the technical program. Three speakers were featured: J. S. Rugg, Elastomer Chemicals Department, E. I. du Pont de Nemours & Co., Inc., who spoke on "Liquid Urethane Elastomers"; Dr. M. E. Bailey, manager of Isocyanates Applications Research, National Aniline Division, Allied Chemical Corp., who discussed "Isocyanate Reactive Coatings"; and James D. Mahoney, director of marketing, Mobay Chemical Co., who spoke on "Flexible Urethane Foams." The after-dinner speaker was Ellis B. Gardner, Jr., vice-president, Hewitt-Robins, Inc., whose topic was "Inflation and How It Affects Research and Development." In a special presentation, C. V. Lundberg (Bell Laboratories) was given an Award of Merit for service as New York Rubber Group chairman in 1958.

The first speaker of the technical program was J. S. Rugg who presented a brief history of urethanes and explained that this field derives its name from the chemical grouping obtained by the reaction of an isocyanate with a hydroxyl bearing compound. He pointed out that intensive development work in the last seven to nine years has taken liquid urethane elastomers from a test tube curiosity to a full fledged article of commerce with an estimated consumption of 750,000 pounds in 1959 and from two to four million pounds in 1960. Mr. Rugg went on to compare the characteristics of neoprene with Adiprene L, a liquid urethane elastomer DuPont is now market testing, and discussed a number of possible applications that exists for liquid urethane elastomers.

In his discussion on the processing of liquid urethanes, he stated that processing costs are reduced by three means: first, raw material and in-process inventories are cut down; second, capital expenditures for equipment are reduced; and third, the number of physical operations is lessened. (Figure 1 shows a flow diagram of a typical conventional rubber manufacturing process from receiving room through to the shipping room.) According to Mr. Rugg, with the advances being made in processing equipment and know-how, it will be possible to have a production molding line that might produce as much as 100 pounds of molded goods per hour and could be operated by one man. (Figure 2 shows a visualized one-man production molding line.)

The second program speaker Dr. Bailey, stated that isocyanates are noted for their reactivity with compounds containing active hydrogen atoms, and that the reactions are equilibrium reactions. He pointed out that on the basis of that which is known now about kinetics of their reactions, considerable control can be exercised to get a desired result by proper selection of reaction conditions. Dr. Bailey explained that a number of isocyanates as well as coreactants are available, and thusly, polymers possessing a wide range of properties can be promised. He said that many of these polymers show useful properties as surface coatings.

J. D. Mahoney, the program's final speaker stated that the significance of recent developments in both the formulating and processing technology of flexible urethane foams is related to the current market structure and poten-

FIG. 1—Typical Rubber Manufacturing Process

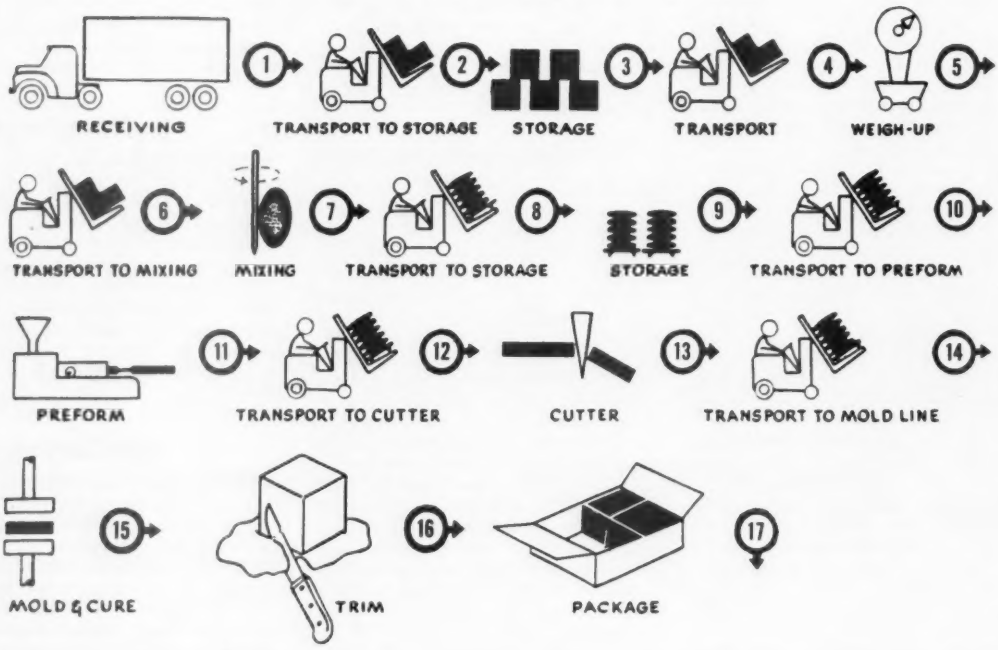
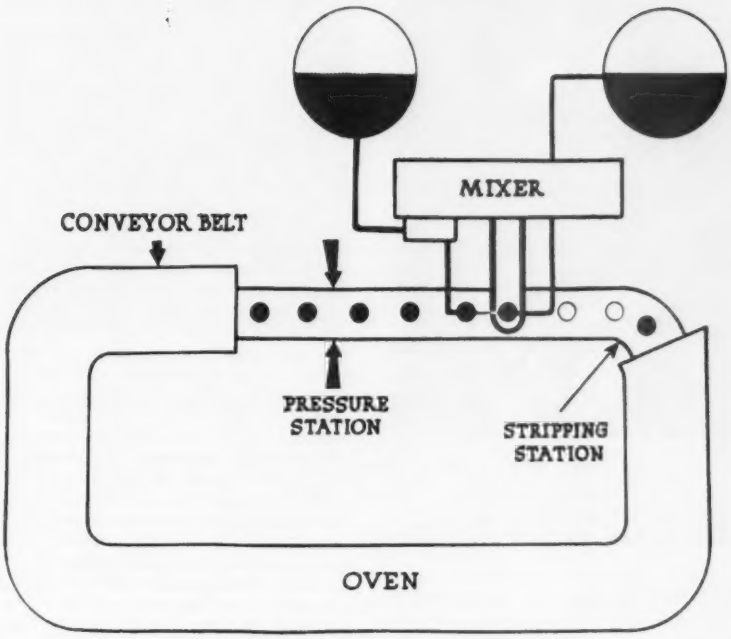


FIG. 2—One-Man Molding Line



tial for these materials. He discussed in detail the basic formulating and foaming systems that have emerged from the original urethane chemical technology during the past few years. Mr. Mahoney compared such recent developments as the "One-Shot" system for polyether foams with more conventional techniques in terms of their effect on production, fabricating and marketing activities on the urethane industry as well as on product application markets. He presented a brief summary of present and potential markets for flexible urethane foams, along with illustrated data on rate of market growth in various product categories since these materials were introduced in the United States.

Mr. Gardner, in his after-dinner talk, stated that during recent years, three powerful forces have increased their impact upon our economy: the dramatic inflationary trend in wages; the dramatic rise in the cost of Big Government; and the equally dramatic growth in new product development. He discussed the trends and interrelationships of these three forces and their combined impact on corporation finances and economics. He explained that research and development has a direct interrelationship with wage inflation and Governmental deficit spending, and the connecting link is corporate profits: the amount of corporate profits which is generated and how it is used.

Speakers at the New York Rubber Group meeting included (left to right): M. E. Bailey, L. S. Rugg, and J. D. Mahoney.

Annual American Toy Fair Attracts Record Attendance

► Some 13,000 toy buyers and visitors attended the 56th Annual American Toy Fair sponsored by the Toy Manufacturers of the U.S.A., Inc. in New York City from March 9 to 14. Over 1,400 toy manufacturers and distributors exhibited their products at the Hotels Sheraton-McAlpin and New Yorker and at private showrooms throughout New York City. An increasing number of products made of or with vinyls, urethanes and latices were shown, as well as many molded rubber toys. Prices are unchanged from last year's levels, but more higher-priced items were shown. There is a trend toward the purchase of quality merchandise, exhibitors said.

Barr Rubber Products Co., Sandusky, Ohio, featured a full line of rubber and vinyl footballs, basketballs and decorated air playballs, in addition rubber indoor and outdoor horseshoe sets. Van Dam Products Inc., New York, N. Y. displayed balloons — highlighting its Popalloon, a balloon with a lollipop attached in a special rubber appendage. Kaysam Corp. of America presented its line of vinyl and rubber infants' squeeze toys and doll parts.

Colored sponge rubber and inflated playballs attracted many buyers to the display of Eagle Rubber Co., Inc., Ashland, Ohio. The Seamless Rubber Co., New Haven, Conn., featured rubber bathing caps and beach bags, while Martin Rubber Co., Long Branch, N. J., highlighted skin diving and swimming accessories. Rempel Manufacturing, Inc., Akron, Ohio, featured a full line of colored squeeze toys ranging from cuddly barnyard miniatures to bigger-than-life-size playpets. Faultless Rubber Co., Ashland, Ohio, displayed its rubber balls for all occasions in addition to an assortment of balloons.

There was a great deal of buying at the Toy Fair, with buyers requesting early delivery of merchandise, indicating that retail inventories are low due to late Christmas buying. Aside from rubber products, there were plenty of wood, metal and fabric dolls, guns, hats, space ships, toy trains and swimming pools to assure happy times ahead for children.

Thiokol Splits Stock

► Thiokol Chemical Corp., Trenton, N. J., has announced that its board of directors has voted a 3 for 1 split in the outstanding capital stock. Subject to approval by company stockholders, the split will be effected on April 30 by distribution, to stockholders of record April 20, of two shares for each one share outstanding. With this split, outstanding Thiokol stock would be increased to 3,692,382 shares from the 1,230,794 presently outstanding.

Charles Wyman

Elbert Davis

Dayton Rubber Establishes New Posts

► Four new manufacturing positions have been established by the Dayton Rubber Co., Dayton, Ohio, in preparation for expanded tire production. The newly created posts were designed to improve production processing and quality controls in the company's program to virtually double tire making capacity during the year. Charles Wyman, previously in charge of tire engineering, has been appointed production manager. Mr. Wyman, who has served the company since 1953, was formerly engaged in tire design.

Charles Moore, who has had more than 19 years of experience in tire engineering and research work, has been named manager of tire development. Robert Radow has been appointed technical superintendent. Mr. Radow has been with Dayton since 1943 and was formerly a compounding specialist in the company's research laboratories. Elbert Davis has been named chief tire compounder for the Dayton plant. Mr. Davis was formerly associated with a major Akron firm as senior project engineer.

Glidden to Build Research Center

► Glidden Co., Cleveland, Ohio, has announced plans for the immediate construction of a million dollar Inorganic Research and Development Center in Baltimore, Md. The new laboratory, to be located on the site of the company's Adrian Joyce Works, will consolidate all of the Chemicals-Pigments-Metals Division's activities in connection with inorganic chemical research, product development and technical service. Equipment will be transferred from other division research units throughout the country and the new laboratory will centralize all of its facilities. According to the company, the new laboratory will incorporate the most modern equipment available, including electron microscopes, various types of X-ray apparatus and spectroscopic analysis equipment. Manager of the new center will be Herbert L. Rhodes, currently director of research and development for Glidden's Chemicals-Pigments-Metals Division.

Nopco to Expand Facilities

► Nopco Chemical Co., Harrison, N. J., has announced that its Plastics Division has broken ground for construction at North Arlington, N. J., that will triple the size of the present plant. According to reports the expanded facilities will provide six times the present capacity for making polyurethane flexible foams and permit expanding facilities for foamed-in-place systems. The expansion will be Nopco's second major construction for plastics manufacture in three years. The original North Arlington plant was built in May, 1956.

Goodyear Expands Foreign Plants

► Goodyear Tire and Rubber Co., Akron, Ohio, plans to expand tire and other rubber products plants in ten foreign countries in order to meet overseas demand. The countries include Argentina, Australia, Brazil, Canada, Cuba, England, Luxembourg, Mexico, Peru and Venezuela. Costs of the projected expansions were not disclosed.

Toronto Section Hears Mark On Polymer Chemistry

► The Toronto Section of the Chemical Institute of Canada held a meeting on March 3 at the University of Toronto, Toronto, Canada, which was attended by over 200 persons. The meeting, sponsored by Dunlop Research Center, featured a talk on "Recent Developments in Polymer Chemistry" by Prof. Herman Mark, director of the Institute of Polymer Research at the Polytechnic Institute of Brooklyn.

Prof. Mark discussed new principles concerning control of polymerization reactions. He stated that only by controlling the manner in which the monomer adds to a growing chain, is it possible to prepare polymers with regular steric configurations. The importance of regular structure lies in its influence on physical and mechanical properties of the resulting polymers, he continued. On the other hand, he pointed out, the irregular polymer usually can not crystallize and gives amorphous polymers which soften at low temperature. He gave an example in polystyrene, where isotactic (stereoregular) polymer has a crystalline melting point of 230°C. as opposed to the atactic (non-regular) material which softens between 80°C. and 100°C.

Dr. Mark pointed out that, whereas the original Ziegler/Natta catalysts were only useful for the polymerization of non-polar olefin monomers, such as ethylene and propylene, the art has now advanced to such a stage that almost any monomer, including vinyl monomers with polar groups, can be polmerized by selection of a suitable catalyst system. He discussed, in particular, three different approaches; the use of "bad" versus weak Ziegler/Natta type catalysts for the polymerization of vinyl monomers; the use of butyl lithium or other anionic catalysts at low temperature for the polymerization of vinyl monomers containing electron-rich substituents. Cationic catalysts may also be found, which if used at low temperture with vinyl monomers containing electron-poor substituents, will also give rise to stereoregular polymers; and the use of free radical catalysts at low temperature with vinyl monomers containing large polar-substituents.

With these new polymerization techniques and the use of well known, readily available monomers, it will be possible to prepare a whole host of new high polymers which will find application in the fiber, rubber and plastics field, Dr. Mark concluded.

► A two-page, fully illustrated article describing methods of selecting the correct materials handling equipment to achieve maximum space, time and manpower savings is among the features of the Fall issue of the *Lewis-Shepard Lever*, a 16-page magazine published by Lewis-Shepard Products, Inc.

William A. Morton

Named to New Research Post

► Organic Chemicals Research Laboratory of the Dewey and Almy Chemical Division of W. R. Grace & Co., Cambridge, Mass., has appointed William A. Morton, formerly Midwest sales manager of the Organic Chemicals Division, as assistant research manager. Mr. Morton, who fills a newly-created position, will be in charge of research administration in the areas of existing product and new product research development and technical service. He joined Dewey and Almy in 1954 after serving with the J. T. Baker Chemical Co., and was appointed Midwest sales manager in 1955.

Mr. Morton received a B.S. in chemical engineering in 1950 from New York University and did graduate work in industrial engineering at Ohio University. He is a member of the American Chemical Society, the American Institute of Chemical Engineers, the Technical Association of the Pulp and Paper Industry, the Federation of Paint and Varnish Production Clubs, and the National Paint, Varnish and Lacquer Association.

Ohm Joins American Zinc

► American Zinc Sales Co. has announced that Ronald J. Ohm, formerly with the Dow Corning Corp., has joined its zinc oxide sales staff in the Indiana-Ohio-Pennsylvania area, and will be headquartered in Columbus, Ohio. With Dow-Corning, Mr. Ohm served in the Cleveland, Ohio office in research and development and in sales service work since 1953. He attended the University of Wisconsin and Valparaiso University, from which he received a B. A. degree in business chemistry. Following graduation, he spent two years in the U. S. Army as supply officer in the Corps of Engineers. His past experience includes development work of emulsions, paint and silicone rubber fabrication. He is a member of the Akron Rubber Group, the Southern Ohio Rubber Group and the Rubber Division of the ACS.

Russia Settles DuPont Claim

► The Soviet Union has reached settlement with E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., of a long-disputed wartime claim through payment to DuPont of $1,500,000. A Soviet spokesman said the settlement was designed to "clear the deck" for exploration of extensive trade possibilities between DuPont and Russia. The DuPont claim was an outgrowth of a wartime arrangement under which DuPont provided to Russia technical information on the commercial production of neoprene synthetic rubber. The data were furnished in expectation that a United States producer would supply the Soviet Union with a plant for synthetic rubber production.

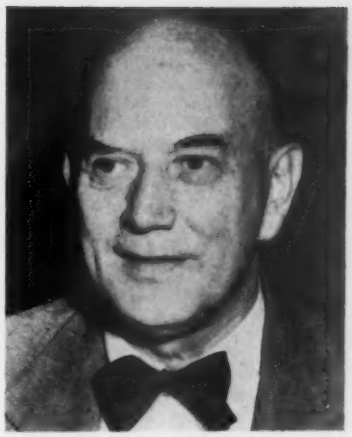
The arrangement had the general approval of the United States government. However, when the Soviet Union applied in 1947-48 for permission to obtain the plant, it was refused under trade restrictions invoked because of the "cold war." The Russians took the position that the value of the information provided by DuPont had been substantially lessened by inability to import the plant. The company filed a claim for payment in 1955.

To Form New Company

► Hercules Powder Co., Wilmington, Del., and Stauffer Chemical Co., New York, N. Y., have agreed to form a new company to make aluminum alkyls, which are compounds for the manufacture of plastics and other products. The firms did not reveal how much would be spent to build a plant, but expect that it would have an annual capacity of more than a million pounds. No site has yet been chosen for the plant and the new company is still unnamed. According to reports, the compounds will be made under a licensing agreement from Prof. Karl Ziegler, a German chemist, who developed them. He also developed a manufacturing process for plastics, also licensed by Hercules. The Hercules-Stauffer plant will be the first large installation in this country to make aluminum alkyls by the Ziegler process, it is claimed. Members of the board of the new company are Dr. Robert W. Cairns, Paul L. Johnson and Alto J. Smith from Hercules; and Archie E. Albright, A. R. Anderson and James W. Kettle from Stauffer.

Goodrich to Expand Plant

► B. F. Goodrich Industrial Products Co., Cleveland, Ohio, has announced that expansion of its Marion, Ohio, hose plant will begin this Spring with completion scheduled by the end of 1959. When in full operation, the expanded plant will enable consolidation of all Goodrich manufacturing facilities for the types of hose presently produced at the Marion plant, the company states.



Seward G. Byam

Byam Retires from DuPont

► Elastomer Chemicals Department of E. I. du Pont de Nemours and Co., Inc., Wilmington, Del., has announced that Seward G. Byam, sales manager in charge of technical publications and a recognized figure in the rubber industry for more than 43 years, has retired from the company. Born in Rome, N. Y., Mr. Byam received his Ph.D. degree in chemistry from Brown University in 1916. Following graduation, he worked as a chemist for the U. S. Rubber Co. in Providence, R. I., and for the United States government's Bureau of Aircraft Production at Pittsburgh, Penna.

Mr. Byam joined DuPont in 1919 as chief chemist at the Fairfield, Conn., plant. Three years later, he left to work as chief chemist at the Plymouth Rubber Co. and in 1923, became general superintendent there. He returned to DuPont in 1925 as assistant plant manager at the Fairfield plant. He was named manager of development at the Newburgh, N. Y., plant in 1931 and the following year, was transferred to the Wilmington office.

Mr. Byam became assistant sales manager for rubber chemicals in 1938; assistant manager of the Rubber Laboratories at Deepwater Point, N. J., in 1941; and associate laboratory director in 1943. Later that year, he was appointed neoprene sales manager and in 1954, he was named sales manager of technical publications. Long active in the Division of Rubber Chemistry of the American Chemical Society and its chairman for the 1952-53 term, Mr. Byam is widely known for his contributions toward standardizing the rubber industry's technical language.

► A profusely illustrated catalog, showing cross sections and sample parts representing the variety of compression molded and extruded products which the company custom manufactures, has been issued by the Geauga Industries Co.

Government Taxes Mrs. Davis

► The Federal Government is still trying to collect a total of $2,131,193 in taxes from two Akron industrialists, Poncet Davis and Sidney L. Albert. In its most recent action, the Internal Revenue Service billed Mrs. Poncet Davis for $961,637. Mrs. Davis, in turn, has filed a court petition which appeals the entire amount. She says the Internal Revenue has claimed erroneously that Mr. Davis transferred huge amounts of cash to her over the years. The income charges against Mr. Davis arise mainly from his operation of the Robbins Tire & Rubber Co., Tuscumbia, Ala.

Mr. Albert, former president of the Bellanca Aircraft Corp., has been billed $363,852 for taxes and penalties in 1956. He is appealing a tax assessment in Federal Tax Court. The case of the Internal Revenue Service against Mr. Albert involves the sale of a Cleveland firm called Lake City Malleable Co. Petitions connected with the same case, along with Mr. Albert's appeal, are: Lake City Malleable Co., signed by Charles Holland, vice-president, for $363,852; Albert-Harris, Inc., signed by Edward J. Harris, president, for $38,000 plus interest; Machinery Terminals, $363,852, with the petition signed by Jerome Smith, president; and Babcock Printing Press Co., $40,000, with the petition signed by Jerome Smith, president.

American Cyanamid Plans New Unit

► American Cyanamid Co., New York, N. Y., has announced that it has broken ground at Bound Brook, N. J., for a multi-million dollar anthroquinone manufacturing facility which will double Cyanamid's annual production of this chemical. The new plant, which will replace and expand existing anthraquinone facilities, will also provide additional production capacity for making methyl anthraquinone, naphthoquinone and phthalic anhydride. According to the company, with the completion of this new facility, Cyanamid will become the only commercial producer of naphthoquinone in this country, the company states.

An out-door-type continuous processing installation with panelboard control, the new plant will cover approximately two acres and will use a completely new manufacturing process developed in the company's research laboratories. Known as the naphthoquinone process, it involves the direct oxidation of naphthalene in a fixed bed catalytic converter, the company states. Development work on the process has been in progress for the past six years and its practicality has been successfully demonstrated in pilot plant operations, the company reports. To be operated by the company's Organic Chemicals Division, the new facility is expected to be completed late this year.

Frank W. Turner

Appointed Enjay Representative

► Frank Wesley Turner has been named a technical sales representative for butyl rubber in the Akron district for Enjay Co., Inc., New York, N. Y. Mr. Turner, who will be based at the company's Akron office, has been associated with the rubber industry since 1951. He received his bachelor's degree in chemical engineering from the Case Institute of Technology in 1951 and has completed the required courses for graduation from the Akron Law School.

Between 1954 and 1956, Mr. Turner served as legal advisor and research and development contract administrator for the Scientific and Professional Personnel Program of the Army. In industry, he has served as sales administrator for nuclear component pressure vessels covering pressurizers, steam generators, heat exchangers and reactor vessels, and has prepared and prosecuted chemical patent applications covering organic chemicals, primarily polymeric materials.

Dunlop Vice-President Retires

► Dunlop Tire & Rubber Corp., Buffalo, N. Y., has announced the retirement of Howard E. Elden, senior vice-president of manufacturing and technical development. Mr. Robert A. Burgoyne, vice-president, manufacturing will assume direction of the Technical Division in addition to his other duties. Mr. Elden started with Dunlop 36 years ago as manager of primary processes. Over the years, he advanced successively to technical manager, vice-president and senior vice-president. Mr. Elden has been a Fellow in the Institution of the Rubber Industry, and during World War II, he was chairman of the Tire and Tube Consulting Technical Committee, Office of the Rubber Division, War Production Board. Although he will not participate in the daily operation of Dunlop, Mr. Elden will actively continue consultation and liaison duties within the Dunlop international organization.

ASTM Evaluates Test Methods

► American Society for Testing Materials, Philadelphia, Penna., has announced that a recently completed testing program indicates that the ASTM fluid aging methods, designated "D 471," can be used satisfactorily at test temperatures up to and including 300° F. The work was conducted by a task group headed by A. C. Simon of the H. O. Canfield Co., Clifton Forge, Va., and composed of representatives from fluid aging subcommittee of the SAE-ASTM Technical Committee on Automotive Rubber, which worked with Subcommittee XIX of ASTM Committee D-11 on Rubber and Rubberlike Materials.

Increasing temperature requirements in both the automotive and aircraft industries necessitated confirmation of present methods as standard test temperature rise above the previous norm of 212° F. or 250° F. An analysis of such variables as elastomeric composition, heating method, contamination and testing techniques failed to show inadequacies in the test method when evaluated on a round-robin basis among five laboratories. ASTM states, however, that stability of the test medium should be suspected when divergent results are obtained. Further work is contemplated to ascertain the suitability of D 471 at temperatures in excess of 300° F.

National Vinyl Group Formed

► National Vinyl Professional Activities Group of the Society of Plastics Engineers, held its first formal meeting on January 30, at the Hotel Commodore in New York City. At this meeting which included more than 60 representatives of various segments of the vinyl industry, the scope of the group's activities was discussed. It was decided that the group should disseminate information about the processing, use and compounding of materials relative to vinyl plastics.

Goals listed were: (1) to aid in the formation of local sections; (2) to provide liaison on programs between sections; and (3) to procure suitable technical papers for presentation at ANTEC. National officers elected at the meeting included, *Chairman*, Robert Abeles (Elfskin); *Vice-Chairman*, Saul Gobstein (Ferro Chemical); and *Secretary*, Joseph Clancy (Emery Industries). At a future meeting, a steering committee will be appointed as an advisory body to the officers.

S. P. Jacobson Promoted

► Brunswick-Balke-Collender Co., Chicago, Ill., has announced the promotion of S. P. Jacobson to executive vice-president of its Bowling and Billiard Division. Mr. Jacobson, who had been a vice-president of engineering and manufacturing, also is a director.

Northern Calif. Hears Hamilton and Stella

► "Polyethylene—Production of Films and Expanded Usage" was the subject of a talk presented to the Northern California Rubber Group by two representatives of Visking Corp.; Harry Hamilton, Jr., western sales manager, and A. A. Stella, technical sales representative. The meeting was held on March 12, at the Berkeley Elk's Club, Berkeley, Calif., with over 100 members in attendance.

In his talk, Mr. Hamilton described some of the major uses for polyethylene film. Such properties as tasteless, odorless, non-toxic, highly tear-resistant and heat-sealable make the film readily adaptable to food packaging, and its good low temperature properties make it ideal for frozen food wrapping, he stated. In the tread rubber industry polyethylene film provides strong lightweight tread backing replacing holland cloth which was formerly used, he explained. Being relatively inert, chemically speaking, the film when first introduced was difficult to print. Owing to technical advances in this field, however, printed film, as well as a variety of colors in the film itself, was made available, making coding for tread identification easier. In connection with floor tile one of the more recent applications of film has been as a moisture barrier under concrete, allowing a better and more lasting adhesion between the tile and cement, he said.

Polyethylene Filmwrap

Mr. Stella described the development of polyethylene filmwrap for bales of synthetic rubber. He noted that this has eliminated most of the soapstone previously used to separate rubber bales. Sheets which are two mils in thickness are generally used in this application, he pointed out. According to Mr. Stella, at the present time, research in this field is directed toward the development of a low melting polyethylene for greater compatibility in rubber mixes. As the melting point is lowered, however, the strength decreases. A black polyethylene film has been developed for use in outdoor warehousing of rubber and compounding ingredients, he said, and film sizes produced are from 3 inches to 16 feet in width and 0.4 to 20 mils in thickness.

On February 19, the Northern California Rubber Group held a technical meeting which featured a talk on "Commercial Jet Air Transportation" by Ray D. Kelly, superintendent of technical development for United Air Lines. Mr. Kelly described the recent advances in air travel, explaining how the new jet transports will enable businessmen to visit any other major city with a radius of some 1250 miles, conduct considerable business and return home the same day. According to the speaker, one of the major problems facing the jet age is the congestion at the airports. He stated that the current air transportation facilities have not kept pace with the needs of our times. Such developments as improved baggage handling techniques and ticket sales which will help alleviate this situation are in the offing, he concluded.

R. S. Savage

W. F. Overberger

J. Platner

Goodyear Promotes Three

► Chemical Division of the Goodyear Tire and Rubber Co., Akron, Ohio, has appointed John Platner as a senior sales engineer in the Rubber and Rubber Chemicals Department. R. S. Savage has been named senior sales engineer in the Coatings Department and W. F. Overberger has been assigned to the division's Development Department. Mr. Platner will be responsible for sales liaison of rubber chemicals and will also be in charge of technical sales service for these materials. He has been with Goodyear since his graduation from Heidelberg College in 1947 with a degree in chemistry. After a period of time in the company's training squadron, he was assigned to the Research Division and remained there until he joined the chemical division in 1953. He received a master's degree in chemistry from the University of Akron in 1954.

Mr. Savage will be concerned with sales service work pertaining to sales of latices to the paint, paper and textile industries. He joined Goodyear in 1950 following his graduation from Syracuse University, where he received a degree in chemical engineering. After squadron training, he was assigned to the Research Division and later, while on leave of absence received a master's degree in business administration from Harvard University. On his return to the company, he was assigned to the Chemical Division and subsequently to a post in the Boston district office. Mr. Overberger, who has been with Goodyear since 1948, is a graduate of Penn State University with a degree in chemical engineering. He formerly served the firm as a development engineer and has also been associated with pilot plant operations. Mr. Overberger has been with the Chemical Division since 1957.

Witco Division and Emulsol Merged

► Witco Chemical Co., Inc., has announced the merger of Emulsol Chemical Corp., Chicago, Ill., a Witco subsidiary, with its Organic Chemicals Division. According to the company, a major purpose of the merger was to widen distribution of Emulsol products through the use of the parent company's extensive sales force. Witco reports that the merger will also result in a 50 per cent expansion of Emulsol research facilities.

Bluestein Addresses Fort Wayne

► The third meeting of the 1958-1959 season of the Fort Wayne Rubber and Plastics Group was held on February 12 at the Van Orman Hotel, Fort Wayne, Indiana. The meeting was attended by 136 members who heard Allen C. Bluestein, of Anaconda Wire & Cable, talk on "Vulcanized Polyethylene."

Mr. Bluestein stated that the technology used in compounding vulcanized polyethylene is a combination of that used in the plastics and rubber fields. He explained that the original work on vulcanized polyethylene was done as far back as the early 1940s, and there is still much to learn about the compounding techniques. Mr. Bluestein concluded that even the simple compounds we have today show very desirable properties and it is expected that industry will find varied uses for them.

Quebec Group Hears Panel On Uses of Reclaimed Rubber

► The Quebec Rubber and Plastics Group held a meeting on March 19, at the Queen's Hotel, Montreal, Canada, at which 73 members heard a panel discussion on the "Uses of Reclaimed Rubber." Moderated by O. R. Huggenberger (Dominion Rubber), the panel was sponsored by the U. S. Rubber Reclaimers Association. The panelists were: John M. Ball (Midwest Rubber Reclaiming); P. J. Mester (Naugatuck Chemical); William R. Macy (Goodrich); John E. Brothers (Ohio Rubber); Jack E. Misner (Xylos Rubber); and G. Croft Huddleston (U. S. Rubber Reclaiming).

Mr. Ball, in his discussion on "What Is Reclaimed Rubber and How Is It Made?", stated that reclaimed rubber is the product resulting from the treatment of ground vulcanized scrap rubber tires, inner tubes and miscellaneous waste rubber articles by the application of heat and chemical agents. He then went on to describe five leading methods of reclaim manufacture.

Mr. Mester, who discussed "What Types of Reclaimed Rubber Are Available?" explained that there are so many permutations and combinations used in the production of finished reclaimed rubber that it is not easy to know which of the modifications should be classified as a distinct type and which is just a modification of existing types. He stated that, fundamentally, there are two basic factors which determine the type of reclaim, one being the type of scrap from which reclaim is made, and the other, the process by which this scrap is reclaimed.

Discusses Reclaim Use

"How Is Reclaimed Rubber Used in Tires and Other Transportation Items?" was Mr. Macy's topic. He began by mentioning figures which dealt with consumption of reclaim, natural and synthetic rubber in the United States and their ratio of use in tires and tire products. He then discussed several typical recipes for component tire parts.

Mr. Brothers presented "What Is the Merit of Reclaimed Rubber in Molded Goods and Other Non-Transportation Items?" He talked about the use of reclaimed rubber in relation to cost structure of the compound and some of the related cost items that reflect themselves in total cost, both directly and indirecly.

Mr. Misner's subject, "What Are Pre-Mixes and How Can They Best Be Used?" dealt with the various types of pre-mix reclaims which may be classified or identified by the type of loading and the type of reclaim such as whole tire, carcass, natural and butyl inner tube. Mr. Misner then discussed several pre-mix reclaim applications.

In "What Are the Major Reasons for Using Reclaimed Rubber?", Mr. Huddleston stated that a certain amount of reclaimed rubber is essential to the manufacture of rubber products because reclaimed rubber possesses certain qualities not found in natural. He enumerated the advantages of using reclaimed rubber when compounding natural rubber, and gave several examples. A question-and-answer session was held following the presentation of each paper.

Seeking Technologists

► Rock Island Arsenal Rubber Laboratory is considering expansion to handle its growing Ordnance-wide rubber program. Its additional new interests include development of high heat and radiation resistant elastomers and rubbers resistant to exotic fuels and oxidizers for missiles. Polymer chemists, rubber chemists and rubber technologists interested in possible positions ranging from $7,000 to $10,000 to start, with periodic increases, should contact Robert F. Shaw, Chief, Materials Research Branch, The Laboratory, Rock Island Arsenal, Rock Island, Ill.

Thiokol Drops Butyl Rubber

► Thiokol Chemical Corp., Trenton, N. J., has decided to discontinue its activities in the butyl rubber field. It is understood that Petroleum Chemicals, Inc., with whom Thiokol has been associated in the development and expansion of markets for butyl rubber, has decided against constructing a butyl plant at this time. PCI is said to feel that the estimated return on its investment is not attractive enough due to the high cost of constructing the necessary manufacturing facilities. It is believed that Thiokol butyl sales representatives will be merged into an enlarged marketing group in the company's Chemical Division in order to broaden services to the rubber industry.

Aetna-Standard Trading Halted

► Governors of the New York Stock Exchange voted recently to suspend trading in the common stock in the Aetna-Standard Engineering Co., Pittsburgh, Penna., at the opening March 20. Stockholders of the company approved liquidation plans on February 20 and later the company's board voted an initial cash liquidating distribution of $25 a share. Aetna-Standard's assets are to be sold to the Blaw-Knox Co., Pittsburgh, Penna.

Nine Papers Scheduled For C.I.C. Rubber Meeting

► The Annual Meeting of the Rubber Chemistry Division of the Chemical Institute of Canada will be held on May 1, at the Sheraton-Brock Hotel, Niagara Falls, Ontario, Canada. The International Meeting of the Ontario and Buffalo Rubber Groups will be held in the late afternoon and evening of the same day. The C.I.C. meeting will feature nine general papers during one session and a symposium on "Ageing and Weathering of Elastomers" for the other session. The papers to be presented are: "A New Chlorine Containing Butyl Polymer," by R. E. Clayton, J. V. Fusco and L. T. Eby (Enjay Co.); "Some Results of Kinetic Studies of Sulphur Vulcanization in the Presence of Accelerators," by Otto Lorenz (Goodyear); "Chemical Nature of Filler Reinforcement," by M. C. Brooks, F. W. Boggs and R. H. Ewart (U. S. Rubber); "Silicone Rubber Developments," by Philip C. Servais (Dow Corning); "Theory and Practice of Antiozonant Usage," by Dr. Thomas H. Newby (Naugatuck Chemical); "Effects of Antiozonants on Weathering of Tires," by Dr. Glen Alliger (Firestone); "Ageing of Rubber: Effects of Metal Contamination," by R. L. Stafford and B. N. Leyland (Imperial Chemical); "Development of a Low Temperature Antichecking Wax," by S. W. Ferris and J. S. Sweely (Sun Oil); and "A Quantitative Ozone Test For Small Specimens," by D. C. Edwards and E. B. Storey (Polymer Corp.).

Lea Fabrics Offers Plan

► Lea Fabrics, Inc., Newark, N. J., has filed a plan in Federal Court to pay unsecured creditors 20 per cent of claims on approval and confirmation of the plan by the court and creditors. Referee William H. Tallyn held a hearing on its approval on March 24. The plan and the schedule of assets and liabilities filed support a previously filed Chapter XI petition and stated that the corporation is also engaged in the television business and in the distribution of motion picture properties.

Assets total $1,620,500, including $410,000 in real estate; $250,000 in negotiable and non-negotiable instruments; $760,000 in machinery and equipment; and $200,000 in personal property. Liabilities total $1,752,784, including $270,608 in unsecured claims; $1,284,200 in secured claims; $1,800 in wages; $102,000 in federal taxes; $14,176 in state taxes and $80,000 in local taxes. Referee Tallyn held a hearing on March 16 on why the machinery and equipment should not be sold to satisfy claims of about $350,000 by Ardisco, Ltd., on chattel mortgages. Morton Wasserman has foreclosed a $362,630 real estate mortgage on the land and buildings.

Buffalo Group Hears White On Nitrile Silicone Rubber

► The Buffalo Rubber Group held its first meeting of the 1959 season on March 3 at the Westbrook Hotel in Buffalo, N. Y. A record number of 115 persons attended the meeting. B. B. White of the Silicone Products Department of General Electric spoke on "Nitrile Silicone Rubber" during a technical meeting, while Dr. Gunter Haase, chief of Long Range Planning Department of Bell Aircraft Corp., gave an after dinner address on the "Conquest of Space."

Mr. White described the development of nitrile silicone rubber at General Electric. He explained that the basic dimethyl siloxane polymer and modifications of the polymer by replacement of methyl groups and phenyl groups, while exhibiting excellent high and low temperature properties and superior resistance to ozone and oxygen, were not resistant to swelling in certain classes of solvents, which included jet fuels and transmission fluids. Modification of the polymer by the introduction of a polar radical, such as the cyano group, greatly reduces solubility of the polymer in their similar solvents, he continued. He pointed out that the per cent of swell at elevated temperatures is reduced to the levels found satisfactory in such applications as oil seals and O-rings. According to Mr. White, compromises for resistance to various solvents can be accomplished by varying the mol per cent of the polar group.

Following dinner, Dr. Haase reviewed the progress and problems in the conquest of space. He thrilled the audience by taking them on an imagined interplanetary journey, at an escape velocity of 35,000 feet per second.

Top row: Messrs. Kuzmick and Schneider; Bottom row: Messrs. Perkins and Gorecki.

Goodyear Conducts AEC Research

► Goodyear Tire and Rubber Co., Akron, Ohio, has received a $50,000 research-development contract from the Atomic Energy Commission to establish an isotopic dating technique for use in industry. The company's Research and Development Division will work in connection with the use of isotopes to determine proper length of storage and service of many military supplies. By measuring the amount of radiation from known radioactive materials, it is possible to compute the age of an item in which the materials are present.

Research will be applied to pairs of selected isotopes so that one serves as a standard against which to measure the other and determine age. Such isotopic dating could be used where code numbers and other markings have been worn away through service, to check on products that have failed or have been returned and to determine when an item should be replaced before there is failure.

Manhattan Rubber Staff Changes

► Joseph N. Kuzmick has been named manager of the Manhattan Rubber Division of Raybestos-Manhattan, Inc., Passaic, N. J., succeeding John H. Matthews, executive vice-president, who has retired from full general management responsibilities of the division. Mr. Matthews will continue as a director of the company and as a consultant. To assist Mr. Kuzmick, Clarence P. Schneider has been promoted to assistant to the divisional manager. The company has also announced that Robert J. Gorecki and Wilder E. Perkins have been named manufacturing general managers. Mr. Kuzmick was previously coordinator of corporation research and development activities. He has been with Manhattan Rubber for 40 years and has been active for many years in the development of abrasive and diamond wheels, synthetic resins, plastic products, bowling balls, brake linings and sintered metal friction products.

Mr. Schneider has been general manager of the Wabash Division at Crawfordsville, Ind., to which he was appointed factory manager when the plant was built in 1951. Previously, he was assistant manager of the Friction Materials Department at Passaic. Mr. Schneider, who started with Manhattan in 1929, will continue to supervise the activities of the Wabash Division as general manager. Mr. Gorecki and Mr. Perkins, who have been named manufacturing general managers, both joined Manhattan Rubber in 1926. Mr. Gorecki will supervise and direct activities of the departments which manufacture molded products, flat belts, packings, friction materials, abrasive and bowling balls. Mr. Perkins will direct the activities of the departments manufacturing V-belts, hose platens, rolls, tanks and blankets.

Names in the News

Amory Houghton, Jr., staff vice-president and a director of Corning Glass Works, has been elected to the board of directors of the B. F. Goodrich Co. **Don C. Miller,** formerly senior vice-president of Kenyon and Eckhardt, Inc., was elected to the post of vice-president, marketing, of the company, and **Charles B. Putnam,** treasurer of the B. F. Goodrich Textile Products Division, has been appointed manager of costs and interplant accounting for the B. F. Goodrich Tire Co., a division of B. F. Goodrich Co.

Brice James, who previously served as assistant advertising manager for G. M. Giannini & Co., Inc., has been appointed sales promotion assistant for the Helipot Division of Beckman Instruments, Inc.

Oscar Niemi, formerly general superintendent in charge of the Injection Molding Department for the Santay Corp., Chicago, Ill., has been named technical service engineer for the Marbon Chemical Division of Borg-Warner Corp.

David Swan, formerly director of research and development for the Linde Co., has been appointed vice-president, research, while **Dr. Leo I. Dana** has been named vice-president, technology, for the company.

Clifford D. Smith, manager of defense products for the Firestone Tire & Rubber Co., has retired after 39 years with the firm.

Harry Dixon, president of Harry Dixon & Sons, Inc., chemical importing firm, was presented with the rank of Chevalier de L'Ordre de la Couronne, by command of King Baudouin of Belgium, in ceremonies at the Belgian Consulate General.

Harvey S. Firestone, chairman and chief executive officer of the Firestone Tire & Rubber Co., has accepted the invitation of General Douglas MacArthur to serve on the United States Businessmen's Committee.

John D. MacArthur has been promoted to manager of the Cincinnati Division of General Tire & Rubber Co., succeeding **F. W. Darbro** who was appointed regional manager of new distribution for the company.

Forrest P. Dewey, formerly managing accountant for Arthur Anderson and Co., has been appointed to the newly created post of manager of cost and accounting methods for Beckman Instruments, Inc.

I. Heckenbleikner has been named research director of Carlisle Chemical Works and its division, Advance Solvents & Chemical.

Hans Stauffer, president of the Stauffer Chemical Co., has been elected to the board of directors of the Columbian Carbon Co.

Robert P. Whipple, patent attorney for Firestone Tire & Rubber Co., has been named head of the Mechanical Division of Firestone's Patent Law Department.

Russell M. Bush has been appointed product sales manager of the Calcium Chloride Division of Michigan Chemical Corp., succeeding **B. C. Tiney,** who has retired after 20 years of service.

Louis E. Bunts, Akron health and sanitary engineer, has been elected president of the Akron Council of Engineering and Scientific Societies, succeeding

T. H. Rogers, research section head, Goodyear Tire & Rubber Co. The council also named **S. J. Mihelick,** Goodyear planning engineer, as vice-president; **Dr. R. E. Lynn,** manager of the Chemical Engineering Department at Goodrich Research Center, as secretary; and **Louis J. Griebling,** head of the Power Engineering Division of Firestone Tire & Rubber Co., as treasurer.

William O. Blandford, who was formerly associated with the Research Department of the National Cash Register Co., has been named assistant to the merchandising manager of the Mechanical Division of the Dayton Rubber Co.

William E. Dugan, partner in the private banking firm of Laidlow & Co., has been elected to the board of directors of Rubbermaid, Inc.

Howard Sides has been elected assistant secretary and assistant comptroller of Texas Butadiene & Chemical Corp.

Robert Erickson, executive vice-president of Beckman Instruments, Inc., was the guest speaker before the Eleventh Annual Industrial Engineering Institute meeting at U.C.L.A. on February 6, and at a similar session at the University of California in Berkeley on February 7.

John W. Barclay has been elected to the board of directors for the Armstrong Rubber Co. He is a member of the law firm of Thompson, Weir & Barclay, and on the board of directors of the Grace-New Haven Community Hospital and the DeForest & Hitchkiss Co.

D. Irving Obrow, treasurer of International Latex Corp., has been promoted to the position of vice-president and treasurer.

Gene Albert has been appointed assistant product manager for the Vulcan Products Division, Reeves Brothers, Inc. He formerly was sales representative on the eastern seaboard.

J. Chester Ray, director of customer relations for the Tire Division of U. S. Rubber Co., retired on February 1, after a career of 49 years with the company.

Albert J. Jones has been appointed to the new position of inventory controller for the Dunlop Tire & Rubber Corp., and **R. Kirk Jones** has been named traffic and transportation manager, succeeding the late **Urban C. Fischer.**

Joseph W. Lockhart has been appointed manager of company facilities for the Tires Division of the U. S. Rubber Co.

J. Lawson Kennedy has been named manager of the White Oil Sales Division of L. Sonneborn Sons, Inc., succeeding **R. William Bjork** who has joined the securities firm of Kamen & Co. as a limited partner.

Frank T. Williams, manager of the Tire Yarn Sales Division of American Viscose Corp., has been appointed chairman of the Merchandising Advisory Committee of Tyrex Inc.

David S. Walker, controller for the Richardson Co., has been elected to membership in the Controllers Institute of America.

Gavin A. Taylor, previously manager of export sales, Europe, for Enjay Co., Inc., has been appointed assistant manager of Enjay's Export Division.

Dr. Ulrich W. Schneibler, Dr. Clarence F. Huber and **Joseph A. Houx** have been added to the research staff of Emery Industries.

R. W. Wettstyne, director of traffic for Firestone Tire & Rubber Co., has been elected president of the Cleveland Chapter, National Defense Transportation Association.

Thomas J. March has been appointed manager of sales for the Silicone Products Department, General Electric Co., succeeding **John T. Castles** who has become general manager of the Chemical Development Operation of the company's Chemical & Metallurgical Division.

Chester J. Noonan, vice-president of the U. S. Rubber Co., has been appointed chairman of the Rubber Products Division for the New York Red Cross Chapter's 1959 fund campaign.

Gordon Research Conferences Study Polymers and Elastomers

► Gordon Research Conferences for 1959 have scheduled a session on Polymers, from July 6 to 10, and a session on Elastomers, from August 10 to 14, at the Colby Junior College, New London, N. H. In the session on Polymers F. R. Eirich will be chairman, while E. M. Fettes will act as vice-chairman. The following papers will be presented:

July 6—New Polymers: "New Developments in the Field of High Polymers", by H. F. Mark; "Research into Extreme-Performance Polymers", by L. W. Butz, A. M. Lovelace and J. C. Montermoso; "Pyroceram", by P. Goodman; "Linear Phosphinoborine Polymers", by F. P. Caserio. W. F. Busse and W. C. Fernelius will lead the discussions.

July 7—Free Radicals: "Recent Developments in Free Radical Chemistry", by C. Walling; "Patterns of Free Radical Reactivity", by A. D. Jenkins; "Solution Polymerization of p-xylene", by L. A. Errede. The discussion leaders will be M. Szwarc and W. E. Cass.

July 8—Ionic Polymerization: "Stereospecific Polymerization of Olefins", by A. V. Topchiev; "Polymers from Diazoalkanes: Mechanisms and Stereospecificity", by A. Nasini; "Polymerization of Diazo Compounds with Boron Catalysts", by C. E. H. Bawn; and "Mechanism of the Anionic Polymerization of Methyl Methacrylate", by D. L. Glusker. D. Pepper and C. G. Overberger will lead the discussions.

July 9—Solid State: "The Para Crystalline Structure of High Polymers", by H. A. Stuart; "Dielectric Absorption in Semi-Crystalline Polymers", by J. D. Hoffman; and "The Nature of the Spherulites in Polyethylene", by F. Price. Discussion leaders will be J. J. Hermans and J. H. Gibbs.

July 10—Structure and Behavior: "Optical Studies of Amorphous Polymers", by E. F. Gurnee; "The Effect of Molecular Weight Distribution on the Mechanical Properties of Polystyrene", by H. W. McCormick; and "The Ultimate Properties of Amorphous Polymers", by T. Smith. A. Bueche will be the discussion leader.

In the conference on Elastomers, to be held from August 10 to 14, Paul G. Carpenter will be chairman, while Robert L. Zapp will be vice-chairman. Papers scheduled for presentation are as follows:

August 10: "A New Technique for Measuring Volume Swell and Its Application to Elastomer Studies", by J. P. Buckley and M. Berber; "Solubility and Viscosity Characteristics of Elastomers", by A. R. Kemp; and "Frictional Properties of Flexible Vinyl Polymers", by R. Norman.

August 11: "The Attrition of Carbon Black: Surface Chemistry and Reinforcing Effects", by A. M. Gessler; "Properties of Attrited Carbon Black", by E. M. Dannenburg; and "Elastomers for High Temperature Services", by E. R. Bartholomew.

August 12: "Observations on Tire Performance", by R. D. Stichler; "Resilience and Power Loss of Elastomers", by A. D. Dingle et al. Another paper to be delivered at this session will be announced.

August 13: "Colloidal Properties of Synthetic Latices", by C. F. Fryling. Other speakers and subjects will be announced later.

August 14: "Vinylic Filler Reinforcement of Elastomers", by Oliver Burke and Eldon Stahley.

The conferences were established to stimulate research in universities, research foundations and industrial laboratories. The sessions were designed to bring experts up to date on latest developments; to analyze the significance of these developments; and to provoke suggestions concerning the underlying theories and profitable methods of approach for making new progress. It is an established requirement of each conference that no part of the information presented is to be used without specific authorization of the individual making the contribution.

Attendance at the conferences is by application. Those interested are requested to send their applications to the director at least two months prior to the date of the conference on a standard application form. Requests for attendance at the conferences, or for additional information, should be addressed to W. George Parks, Director, Department of Chemistry, University of Rhode Island, Kingston, R. I.

New General Latex Unit On Stream

► General Latex & Chemical Corp., Cambridge, Mass., has opened a new compounding plant, the company's sixth, at Charlotte, N. C. The plant, which covers an area of 25,000 square feet, has been in operation since November 1958. It has a fully integrated staff, research and development laboratories and complete facilities for compounding rubber latices for the textile, rubber, automotive, and upholstery industries. The facility also provides the complete line of General Latex products, including Harrisons and Crosfield Malayan latex and Goodyear Pliolite latices. Key personnel includes, Jack Hobbs, district sales manager; Ernest Horton, sales representative; and Everett Eldridge, chief control chemist.

Panel Discusses Carbon Black

► The Chicago Rubber Group held a meeting on March 13, at the Furniture Club in Chicago, Ill. Approximately 250 members and guests attended the meeting which featured a panel discussion on "The Latest Information on Carbon Black." Moderated by Milton H. Leonard (Columbian Carbon), the panel was comprised of Dr. Walter R. Smith, associate technical director for Godfrey L. Cabot, Inc., who spoke on "Physical Aspects of Reinforcement"; Merton Studebaker, technical service engineer for Phillips Chemical Co., whose subject was "Chemical Aspects of Reinforcement"; and Carl W. Snow, manager of sales service for United Carbon Co., Inc., who discussed "Practical Applications of Carbon Black." Abstracts of these talks will appear in a future issue of RUBBER AGE. Following the talks by the panel members, a question-and-answer period was held.

Goodyear to Increase Stock

► Goodyear Tire & Rubber Co., Akron, Ohio, has announced a plan by the board of directors by which the number of its authorized common shares would be increased. According to reports, the purpose of the plan is to raise the presently authorized 15,000,000 shares to 40,000,000 shares, and to change to no par value the existing $5 par value of the shares. The company added that it has no present intention of issuing additional shares. At the end of 1958, Goodyear had 10,815,057 common shares outstanding out of its presently authorized 15,000,000 shares.

Financial News

Goodrich Reports a Decline In 1958 Earnings and Sales

► B. F. Goodrich Co., Akron, Ohio, has reported a 9.9 per cent decline in its 1958 earnings from the 1957 level and a 5.1 per cent drop in sales over the same period. According to the company, its consolidated net income for 1958 was $35,457,421, equal to $3.93 per share of common stock, compared with $39,369,705, or $4.40 per share for 1957. Goodrich's consolidated net sales for 1958 totaled $697,297,556, compared with $734,650,802 in 1957.

Dividends received from associated companies (not consolidated) in which Goodrich has less than majority ownership are included in the net income. Increases in equity in net income retained by associate companies, amounting to $1,127,000 for 1958, and $4,035,000 for 1957, are not included in the net income.

The company paid dividends of $2.20 a share on common stock in 1958, the same as for 1957. Total dividend payments to stockholders were $19,729,215 in 1958 and $19,684,849 in 1957. Capital expenditures and investments for plant, equipment and research facilities totaled $27,616,000 in 1958, compared with $38,871,000 for the previous year. The company's net working capital on December 31, 1958, was $252,373,356, against $243,925,923 for the same period of 1957. Inventories at the end of 1958 were $154,100,183, compared with $168,725,391, at the close of 1957.

Clevite

► Year ended December 31: Net income amounted to $3,109,246, equal to $1.60 per share of common stock ($1.91 before change in depreciation method), compared to $3,988,539, equal to $2.08 per share for 1957. Net sales totaled $63,354,991, compared to $71,368,224 for the previous year.

U.S. Rubber Reclaiming

► Year ended December 31: Net income before taxes amounted to $638,210, compared with $121,595 for 1957. Net income in 1958 after taxes amounted to $301,210, compared with $53,365 the previous year.

Lee Rubber

► Year ended December 31: Net earnings in 1958 were $1,797,919, compared with $1,762,581 for 1957. Net sales in 1958 totaled $46,558,852, compared with $46,601,093 for the previous year.

Dayton Rubber

► Quarter to January 31: Net income amounted to $273,896, equal to earnings of 24c per share of common stock, compared with $200,963, equal to 17c per share for the same period last year. Net sales totaled $19,756,402, compared with $18,222,727, for the like period of last year.

United Carbon

► Year ended December 31: Net income after taxes amounted to $5,582,963, equal to common share earnings of $4.54, compared with $6,235,954, equal to $5.07 per share in the previous year. Net sales for 1958 totaled $56,482,321, compared with $59,254,653 for 1957.

Farrel-Birmingham

► Year ended December 31: Net income for 1958 amounted to $1,401,268, which is equal to $4.38 per share of common stock, compared with $2,378,112, equal to $7.43 per share for the previous year. Net sales in 1958 were $35,525,530, compared with $50,868,484 the previous year.

Scovill Manufacturing

► Year ended December 31: Net loss in 1958 amounted to $131,470, compared to net income in 1957 of $2,364,486, equal to earnings of $1.31 per share of common stock. Net sales in 1958 totaled $121,127,744, compared with $129,671,743, the previous year.

Armstrong Cork

► Year ended December 31: Net income amounted to $13,607,382, equal to $2.60 per share of common stock, compared with $11,068,782, or $2.10 per share for 1957. Net sales in 1958 totaled $249,859,203, compared with $246,528,518 for the previous year.

Seiberling Rubber

► Year ended December 31: Net income was $1,070,089, equal to $2.06 per share of common stock, compared with $943,011, equal to $1.75 per share for the like period of 1957. Net sales for 1958 totaled $48,134,084, compared with $46,934,437 for 1957.

Pierce & Stevens

► Year ended December 31: Net income in 1958 amounted to $513,193, earning $1.58 per share of common stock, compared to $420,612, equal to $1.30 per share for the previous year. Net sales totaled $7,477,111, compared to $6,853,610 for 1957.

Firestone Reelects Officers

► The Firestone Tire & Rubber Co., Akron, Ohio, has announced the reelection of its directors and officers at its annual stockholders' meeting. Reelected as directors were Harvey S. Firestone, Jr., Lee R. Jackson, Raymond C. Firestone, James E. Trainer, Leonard K. Firestone, Roger S. Firestone, John J. Shea, Harvey H. Hollinger and Joseph Thomas.

At the meeting of the board of directors which followed the stockholders' meeting, the following officers were reelected: *Chairman,* Harvey S. Firestone, Jr.; *Vice-Chairman,* Lee R. Jackson; *President,* Raymond C. Firestone; *Executive Vice-President,* James E. Trainer; *Vice-President,* Harvey H. Hollinger; *Vice-President, Secretary* and *General Counsel,* Joseph Thomas; *Vice-President,* Harold D. Tompkins; *Vice-President,* Harold M. Taylor; *Vice-President,* John L. Cohill; *Vice-President,* Earl B. Hathaway; *Vice-President,* Joseph A. Meek; *Vice-President,* Louis J. Campbell; *Treasurer,* Elton H. Schulenberg; *Comptroller,* Claude A. Pauley; *Assistant Treasurer,* Eldon H. Eaton; *Assistant Secretary,* Henry S. Brainard; *Assistant Secretary,* Byron H. Larabee; *Assistant Comptroller,* Laurence A. Frese; *Assistant Comptroller,* Robert P. Beasley; and *Assistant Comptroller,* Lee R. Shannon.

At the board meeting, John J. Shea announced his retirement as vice-president and chairman of the finance committee. Mr. Shea, an executive with 51 years of service with Firestone, has been an officer and director of the company for 37 years. He will continue as a member of the board of directors. He joined Firestone in the Accounting Department in 1907, and became treasurer of the company and a member of the board in 1922. He was elected vice-president and treasurer in 1941, and vice-president in charge of finance in 1948. In 1957, he was named vice-president and chairman of the finance committee.

Janda Named by G-E

► Frank C. Janda has been named sales representative by the Silicone Products Department, General Electric Co., Waterford, N. Y. He will be in charge of the new Midwestern sales territory with headquarters at 2375 Hampton Ave., St. Louis, Mo. A 1951 graduate of DePaul University with a B.S. degree in chemistry, Mr. Janda received several years experience as a sales engineer with the chemical and petroleum industry, prior to joining General Electric in March, 1956. After several months experience on the sales program in the firm's Chemical & Metallurgical Division, he joined the sales force of the Silicone Products Department. Since that time, he has served as a sales representative in the department's Chicago district.

Charles M. Coffin

Promoted by Goodrich

► Charles M. Coffin has been named vice-president of manufacturing for the B. F. Goodrich Industrial Products Co., a division of the B. F. Goodrich Co., Akron, Ohio, succeeding Rollin D. Hager, who is on extended leave of absence. Mr. Coffin, formerly superintendent of manufacturing services for the B. F. Goodrich Footwear and Flooring Co., Watertown, Mass., joined Goodrich in 1930 as a designer in the footwear and flooring company. He became manager of plant development in 1951 and in 1954, was named divisional superintendent of engineering and maintenance. He was named to his most recent post last year. Mr. Coffin attended Lowell Institute, Boston, Mass., and completed college extension courses at Harvard University and The Massachusetts Institute of Technology.

DuPont Neoprene Latex

► E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has announced the development of a new latex with many-fold increases in certain outstanding neoprene properties. DuPont reports that the latex, "Type 400," can yield products with more than twice the heat resistance, three times the tear strength and 15 times the ozone resistance possible with previous neoprene latices. According to the company, Type 400 shows particular promise as a binder for natural and synthetic fibers and any tendency to tender or discolor cellulosic materials is greatly reduced. It is reported that adhesives prepared from Type 400 have good water resistance and excellent cohesive strength at high temperatures. Electrical properties of films of Type 400 latex approach those of natural rubber with values for direct current resistivity on the order of 60 trillion ohms-centimeter and dielectric strength of 1050 volts per mil of thickness, DuPont stated.

Firestone Appointments

► Firestone Tire & Rubber Co., Akron, Ohio, has announced three appointments in the Tire Engineering and Development Department and two appointments at the Des Moines, Iowa plant. Robert C. Brooker has been named manager of passenger tire engineering, Kenneth L. Campbell, Jr., manager of truck and off-the-highway tire engineering and Robert S. Lee, manager of passenger tire construction. E. H. Strobel has been named plant manager at the Des Moines plant and James E. Trainer, Jr. succeeds him as plant production manager.

Mr. Brooker joined Firestone in 1947 after graduating from Cornell University with a B.S. degree in mechanical engineering. Mr. Campbell graduated from Cornell University in 1945 with a B.S. degree in mechanical engineering, and in 1946 he joined Firestone after receiving an Associate in Arts degree from Princeton University. Mr. Lee graduated from Indiana Technical College in 1948 with a B.S. degree in mechanical engineering and earned a masters degree in automotive engineering at the Chrysler Institute of Engineering. He joined Firestone in 1950 as a project engineer in the Development Department.

Mr. Strobel has been with Firestone for 17 years and served at the Des Moines plant since 1954. Mr. Trainer has been with the Des Moines plant since 1955. He joined Firestone in 1948 and worked in Firestone plants in Akron and Memphis before assignment to Des Moines.

DeVilbiss Stock Distribution

► DeVilbiss Co., Toledo, Ohio, has announced that its directors have voted to recommend a one-for-one stock distribution and an increase in the number of common shares and capital of the company. This proposal will go before the shareholders for adoption at the annual meeting on April 27. The number of $15 par common shares which DeVilbiss is authorized to issue would be increased from 600,000 to 1,500,000. The capital of the firm would be raised to $11,550,000 from $5,775,000. The board has no present intention of issuing any new authorized shares other than those needed to effect the recapitalization and stock distribution plan, the company stated.

Tamms Combines Departments

► Tamms Industries Co., Chicago, Ill., has combined its raw material and foundry and flooring units into a single Flooring and Industrial Materials Department. The new department will be headed by Fred W. Knisley, vice-president, who formerly headed the Foundry and Flooring Sales Unit. Louis R. Wahl, formerly assistant sales manager of the Raw Material Division, will be assistant department head.

Charles E. Lowden

Named Sales Representative

► Pigments Division of the American Cyanamid Co., New York, N. Y., has appointed Charles E. Lowden as a sales representative in the metropolitan New York area. Mr. Lowden joined Cyanamid in 1957 as a technical service and sales trainee at the Bound Brook, N. J., plant. He had previously served with the U. S. Army in Germany. A graduate of St. Peters College in Jersey City, he is a member of the American Chemical Society.

U.S.I. Plant on Stream

► U. S. Industrial Chemicals Co., Division of National Distillers and Chemical Corp., New York, N. Y., has announced that its polyethylene compounding plant at Tuscola, Ill., has come on stream with an initial capacity of 25 million pounds per year. According to the company, the new plant will compound "Petrothene" polyethylene resin with carbon black and other additives to produce electrical and pipe resins. Production from the new plant, the company states, will support USI's effort to expand sales of polyethylene for use in electric wire insulation and plastic tape. According to the USI, the primary object of the new plant is to assure production of high and uniform quality ploye thylene compounds which are necessary to meet critical electrical insulation requirements.

Wendrow Gives Talk

► Benjamin R. Wendrow, technical manager of the U. S. Rubber Reclaiming Co., Buffalo, N. Y., was to have been the principal speaker at the meeting of the Scrap Rubber and Plastics Institute on April 6 at the Edgewater Beach Hotel, Chicago, Ill. The meeting was held during the 46th Annual Convention of the National Association of Waste Materials Dealers, Inc. Mr. Wendrow's presentation was scheduled to be on "Reclaimed Rubber—Its Place in the Rubber Industry," in line with the NAWMD convention theme "Project '59 . . . Meeting Today's Need and Tomorrow's Challenge."

West Coast News

► Over 250 members attended the March 3 technical meeting of The Los Angeles Rubber Group at the Biltmore Hotel in Los Angeles, Calif. The featured speaker was E. W. Hollis, general sales manager for the Lewis Welding & Engineering Corp., who spoke on "True Injection Molding of Rubber Compounds."

He stated that injection molding of natural and synthetic rubber compounds is not only possible and practical, but it is a generic method of molding and is particularly advantageous in a wide range of industrial and consumer items of mechanical rubber goods. He pointed out that the advantages of injection molding, when properly employed, will reflect in lower manufacturing cost due to reduction in direct labor; material consumed; and reduced scrap loss due to machine, rather than human, control of the variable elements of the molding circumstance. Mr. Hollis reported that injection equipment is now available to the industry and the design of trimless molds for use with injection equipment has been reduced to practice, and that practice is spreading rapidly.

According to Mr. Hollis, the injection machine can, today, be fed its supply of compound automatically and its cycle can readily be controlled to reproduce itself continuously and automatically without human supervision or service. The only remaining step then, to achieve fully automatic manufacture of this class of rubber products, lies in the development of the mechanics of part removal from the mold. This will be personalized to each particular part and should provide food for thought to those who have the courage and tenacity to develop new industrial processes and methods, he concluded.

At the February 3 technical meeting of TLARGI, C. A. Carlton, technical director for J. M. Huber Corp., gave a talk on "Heat Generation of Rubbers and Rubber Compounds During Processing." Mr. Carlton explained that a procedure suitable for accurately comparing the heat generating characteristics of rubbers and rubber compounds during processing has been developed. He pointed out that various rubbers, carbon blacks and non-black pigments have been compared for heat generating properties. According to Mr. Carlton, the Banbury heat generation procedure is ideally suited for comparing rubber compounds of widely varying types as regards the tendency to scorch.

► Shell Development Co., Emeryville, Calif., dedicated a newly built lecture hall at its Research Center on March 9. The dedication was made by Dr. Harold Gershinowitz, president of the company. Guest speakers at the ceremony were Joel Hildebrand, retired professor of chemistry at the University of California and former dean of the College of Chemistry there, and Dr. Peter Debye, professor of chemistry emeritus at Cornell University, and winner of the 1936 Nobel Prize. The new auditorium seats 295 persons and represents the ultimate in design engineering. Normal conversation tones are all that are needed for two-way communication from as far away as the back row to the speaker on the stage. According to Shell, the hall will be used to hold lectures and seminars conducted by world-renowned scientists to insure that Shell's scientists are always kept up-to-date with the latest developments in the fields of the physical sciences and engineering.

► Tracerlab, Inc., Waltham, Mass., has announced the dedication of a new laboratory addition to its Reactor Monitoring Center, Richmond, Calif. According to the company, the new addition will be devoted exclusively to the Atomic Energy Commission "Sunshine" Analytical Program. The new laboratory, which cost $40,000 comprises approximately 1500 square feet of laboratory space, and utilizes $150,000 worth of complex electronic instrumentation for the precise work required.

► Enjay Co., Inc., Los Angeles, Calif., has announced that Don Carr has joined its staff as a sales representative. Mr. Carr is a graduate from the University of Southern California where he received his B.S. degree in chemical engineering.

► Thomas B. Squire, formerly with Parker Seal Co., Culver City, Calif., has joined the H. O. Canfield Co., Clifton Forge, Va.

MacLeod Named to New Post

► John C. MacLeod has been named to the newly created post of assistant to the president in charge of operations for the Barrett Division of the Allied Chemical Corp., New York, N. Y. Mr. MacLeod, who will be in charge of manufacturing, engineering, purchasing and related functions, was formerly assistant director of operations for Allied's Solvay Process Division. He has been with Allied since 1925. A graduate of Queens University, he holds a degree in chemical engineering. Mr. MacLeod is a member of the American Chemical Society and the Syracuse Management Council.

Shell Chemical Reorganizes

► Shell Chemical Corp., New York, N. Y., has announced a company reorganization, effective January 1, in which four fully-integrated divisions have been formed. With each division reflecting a company product line, Shell Chemical now has five fully-integrated divisions in operation. These are the Agricultural Chemicals, Ammonia, Industrial Chemicals, Plastics and Resins, and Synthetic Rubber Divisions.

The head office, in New York City, will be concerned mainly with matters involving more than one division, or of interest to the company as a whole. Four vice-presidents have been assigned to this operation including Cecil W. Humphreys; George R. Monkhouse, who was formerly in charge of the Ammonia Division; Bernard M. Downey, formerly general manager of manufacturing operations; and George W. Holdrum, Jr., previously manager of the company's Chemical Sales Division.

Sumner H. McAllister, formerly manager of the Agricultural Chemical Sales Division, has been appointed head of the new Agricultural Chemicals Division. The Ammonia Division, already and integrated operation, will be headed by Lawrence M. Roberts, formerly manager of operations in that division. Alfred W. Fleers, formerly general manager of manufacturing, technical, has been named to head the Industrial Chemicals Division. The Plastics and Resins Division will be headed by Martin Buck, formerly assistant to the president. The Synthetic Rubber Division will be headed by John P. Cunningham, formerly manager of the Synthetic Rubber Sales Division.

ACS Division Officers Named

► Dr. Victor K. La Mer, professor of physical chemistry at Columbia University has been elected chairman of the Division of Colloid Chemistry of the American Chemical Society, while Dr. James M. Church, professor of chemical engineering at Columbia, will be chairman of the ACS Division of Industrial and Engineering Chemistry. Professor La Mer succeeds Dr. William A. Zisman, head of the Surface Chemistry Branch of the Naval Research Laboratory. Other new officers of this division include *Chairman-Elect*, Dr. Stephen Brunauer (Portland Cement Association); *Vice-Chairman*, Donald P. Graham (DuPont); and *Secretary-Treasurer*, Dr. Frank H. Healey, Jr., (Lever Brothers Research). Dr. Church succeeds DeWitt O. Myatt of the Atlantic Research Corp. Other officers of the Division of Industrial and Engineering Chemistry are *Chairman-Elect*, O. H. York (Otto H. York); *Secretary*, Dr. Brage Golding (Lilly Varnish); and *Treasurer*, J. W. Mohlman (Standard Oil).

Pennsylvania Tire Builds Plant

► A new industrial plant for the manufacture of tread rubber will be constructed at an industrial site on the northwest outskirts of Paris, Texas, by the Pennsylvania Tire Co., Mansfield, Ohio. The plant, a half-million-dollar installation, will initially have a capacity of 750,000 pounds of tread rubber monthly. It is designed to provide for future expansion and ramification into additional lines, including the possible manufacture of passenger car and truck tires. To be built on a 30 acre site, the modern office and factory building will be a one-floor structure of brick, concrete and steel construction containing 25,600 square feet of floor space. Target date for completition and the start of production operations is July 1.

Huber Names Distributor

► J. M. Huber Corp., New York, N. Y., has named the Daniel G. Hereley Co., Chicago, Ill., as exclusive distributor for its kaolin clay extenders, carbon black and Zeolex synthetic silicate pigments. The company reports that the Hereley organization will service the paint, varnish, printing ink, plastics and specialty processing industries in the Chicago area.

Heyden Newport Appoints Pinto

► Leonard F. Pinto has been appointed manager of rubber chemicals for the Newport Chemical Corp., New York, Newport Industries Division of Heyden N. Y. Mr. Pinto received his A.B. degree in chemistry from Fordham University and did graduate work in organic chemistry at Marquette University. He has been on the technical sales service staff of Newport Industries since 1947. Prior to joining the company, he was associated with Benjamin T. Brooks as a consultant in laboratory organic research, and with the research laboratories of Ludwig Rosenstein in consulting activities for the Texas Co. Mr. Pinto is a member of the American Chemical Society, the Rubber Division of A.C.S., the Akron Rubber Group and the Southern Rubber Group.

Field Named Representative

► Commercial Solvents Corp., New York, N. Y., has announced that Harry Field has joined its sales staff in Cleveland, Ohio, succeeding Russell T. Smith who is on military leave of absence. Mr. Field, a graduate from Western Reserve, formerly was with the Ferro Corp. as a research chemist.

Stauffer Appoints Three

► Stauffer Chemical Co., New York, N. Y., has appointed Thomas A. Williams assistant to the general manager, W. S. Gillon as plant manager and William K. McPherson as production manager of its Molded Products Division in San Francisco, Calif. Mr. Williams holds a B.S. degree in chemical engineering from Columbia University and an M.B.A. degree in business administration from Harvard University. Mr. Gillon is a mechanical engineering graduate from McGill University, and joined Stauffer in 1955. Mr. McPherson majored in business administration at the University of Akron and, after a number of years' experience in the rubber industry, joined Stauffer in 1949.

Reorganizes Sales Department

► Hewitt-Robins, Inc., Stamford, Conn., has announced that its Foram Products Division has reorganized its Sales Department, centralizing control of the entire operation at the company's general offices in Stamford. Charles A. Maher, formerly southeastern sales manager at Charlotte, N. C., has been appointed to the newly-created post of manager of field sales with headquarters in Stamford.

An Editorial Index to Volume 84 of RUBBER AGE appears on pages 175-178 of this issue

COWLES
CIRCULAR KNIVES
Complete line of circular knives, blades and special tools for the rubber tire and mechanical rubber industries, including bias, de-beading, hog, scraper, skiving, tread and other special knives for rubber cutting operations. For efficient, low cost service specify "Cowles" standard and special knives.
COWLES TOOL COMPANY
2110 WEST 110th STREET
CLEVELAND 2, OHIO
Write for New, Fully Illustrated Bul. No. 571 Today.
COWLES

Canadian News

► Polymer Corp. Ltd., has announced a change of organization of its Research and Development Division on a project basis. The company has announced that N. J. McCracken, assistant manager of the division, will assume responsibility for the over-all program under Dr. E. J. Buckler, recently named vice-president of research and development. Dr. H. L. Williams, who has been appointed projects manager, is responsible for the activity in the major fields of research and development, each of which will be under a project supervisor. According to the company, the reorganization of the division is an indication of its reaction to the rapidly expanding competition in the field of synthetic rubber. The company also announced the awarding of building contracts to two Sarnia firms for construction of a service building and a new synthetic rubber pilot plant.

► According to a recent survey, the rubber industry in Canada spent $4,450,000 (Canadian dollars) in 1958 on research and development, a 3.53 per cent increase over the 1957 expenditure of $4,300,000. The rubber industry is far down on the list of big research spenders, with transportation equipment plants accounting for almost one-half of the total expenditures on research and development, some $77,990,000, with the total being $160,990,000. Electrical apparatus and supplies were second with expenditures totaling $15,940,000, and chemical products were third, spending $14,240,000. The Canadian rubber industry ranged 10th on the list.

► Some 1,600 workers at Goodyear Tire & Rubber Co.'s new Toronto plant and Long Branch distribution center have received an average 7.5c per hour wage increase in a one-year agreement between the company and Local 232, United Rubberworkers. The agreement provides 6c to day workers, 5.5c to piece workers, an additional 5c to skilled tradesmen in the Engineering Division and 8c to technicians. Pre-contract average hourly rate for male workers was $2.17 with a top skilled rate of $2.30. The labor rate was $1.49.

► M. F. Anderson, formerly general manager of the Naugatuck Chemical and Latex and Reclaim Divisions of the Dominion Rubber Co., Ltd., has been appointed executive vice-president and elected a director of the company. Mr. Anderson was born in Maxville, Ont., and obtained his B.A. degree at McMaster University in Hamilton. He joined Dominion Rubber in 1927 as director of central industry engineering. In 1934, he was sales manager of the Central Division in Toronto and in 1939, he was placed in charge of new products development. Later, Mr. Anderson became general manager of the Naugatuck Chemical and Latex and Reclaim Divisions.

► The annual convention of the Division of Rubber Chemistry of the Chemical Institute of Canada will be held on May 1, 1959, at the Sheraton-Brock Hotel, Niagara Falls, Ontario. The feature of the meeting will be a symposium on the "Aging of Elastomers." The technical sessions will be followed by the annual joint meeting of the Ontario and Buffalo Rubber Groups.

► Nuodex Products of Canada, Ltd., has announced that G. H. Clifford Smith, previously executive vice-president, has been elected president, succeeding William B. Bate, who has been elected chairman of the board. The company also announced that John F. Lang, vice-president in charge of commercial development, has been named executive vice-president.

► Shawinigan Chemicals, Montreal, has announced the election of Dr. Hugh S. Sutherland, formerly executive vice-president and general manager, to the post of president, succeeding R. S. Jane, who died. Dr. Sutherland has been with the company since 1931. He is chairman of the board of directors of the Chemical Institute of Canada.

► Rohm and Haas Chemical Co. of Canada has purchased 210 acres in the Morrisburg, Ontario area. According to the company, it plans to construct a $2 million chemical plant on the site.

Seiberling Sells 106,841 Shares

► Seiberling Rubber Co., Akron, Ohio, recently offered its common stockholders the right to subscribe, at $14 a share, to 106,841 shares at the rate of one share for each of four held on January 19. The offer, which expired February 4, was underwritten by a group of investment bankers headed by Eastman Dillon and Union Securities & Co. Proceeds from the sale of the shares, together with a $3,000,000 term loan, which was being negotiated at the time of this writing, will be used to retire $1,000,000 of existing long-term debt and for working capital. Giving effect to the recent financing, the company will have outstanding 534,205 shares of $1 par common stock, 40,210 shares of preferred of $100 par and a funded debt of $4,000,000.

Hooker Forms New Divisions

► Hooker Chemical Corp., Niagara Falls, N. Y., has formed an autonomous Eastern Chemical Division and has also made autonomous the previously formed Phosphorus Division, placing both on the same basis as the company's Durez Plastics Division. Headquarters for the Eastern Chemical Division will be at Niagara Falls, while Phosphorus Division headquarters will remain at Jeffersonville, Ind. Thomas F. Willers and F. Leonard Bryant, vice-presidents, have been appointed general managers of the Eastern Chemical and the Phosphorus Divisions, respectively. Also appointed to Eastern Chemical were Charles Y. Cain, as assistant sales manager, and Charles W. Selover, as manager of purchases.

Mr. Willers joined Hooker in 1941 as a cost analyst. He was elected a vice-president and treasurer in 1957 and has been comptroller since 1951. Last year, he was elected a director and treasurer of Hooker Chemicals, Ltd., and of Marble-Nye Co., a Hooker marketing subsidiary in New England. Mr. Bryant has been vice-president of production for Hooker since 1957. He is also a director and vice-president of Hooker Chemicals, Ltd., and was recently elected a director and assistant secretary of HEF, Inc., a jointly owned Hooker subsidiary.

Mr. Cain was formerly assistant general sales manager of the Durez Plastics Division and Mr. Selover was manager of purchases for the Niagara, North Tonawanda and Kenton plants. Mr. Selover will continue to administer the purchasing functions for the Niagara plant and will also continue as manager of purchases for the Durez Plastics Division plants at North Tonawanda, N. Y., and Kenton, Ohio.

Shell Development Names Two

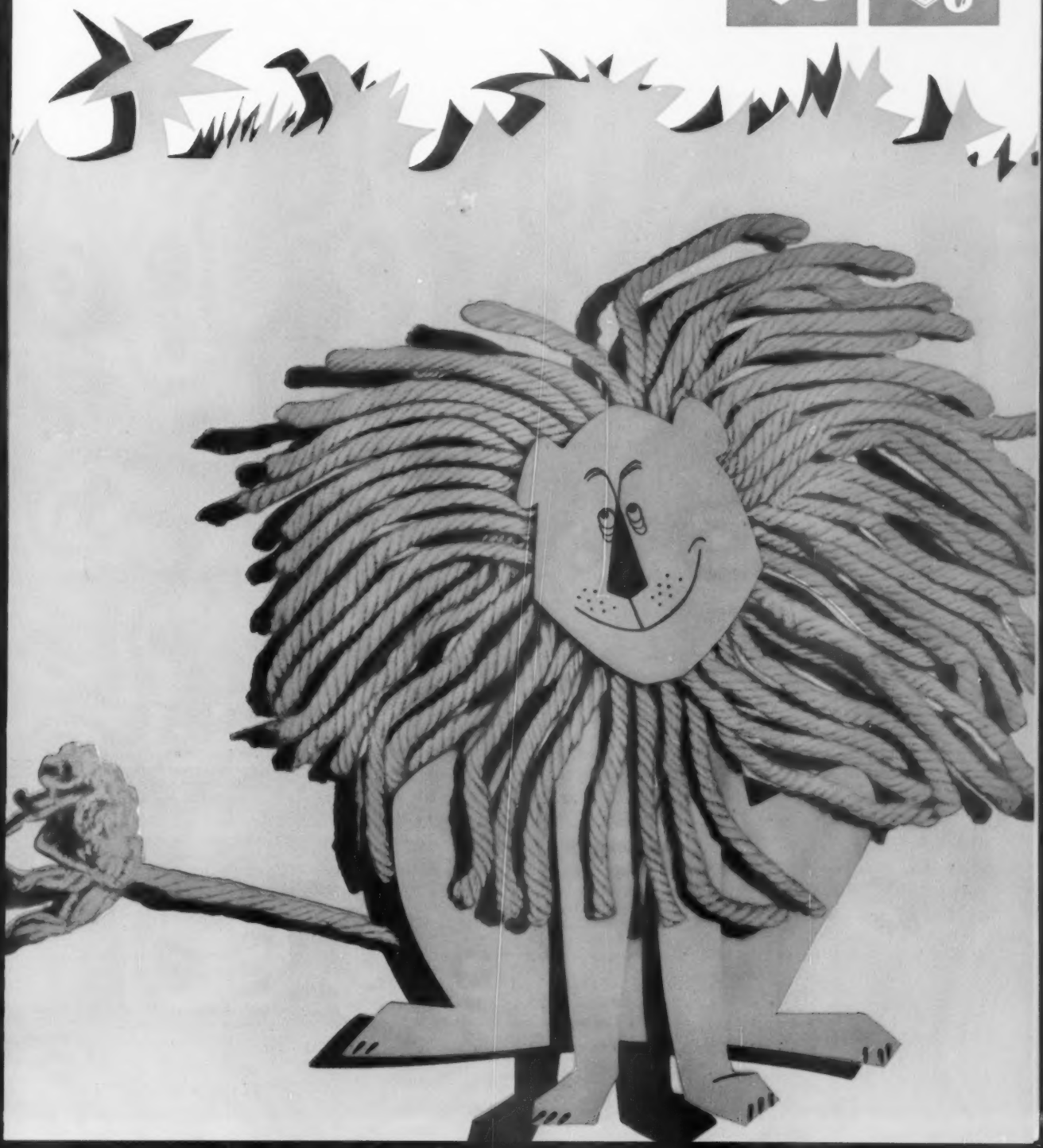
► Shell Development Co., Emeryville, Calif., has appointed Dr. C. W. Smith as head of the Organic Chemistry Department at the company's Emeryville Research Center, and Dr. P. H. Deming as assistant head in the department. Dr. Smith succeeds F. M. McMillan who is now manager of research and development in the Plastics and Resins Division, Shell Chemical Corp. Dr. Smith joined the company in 1943 after receiving his Ph.D. degree from the University of Illinois. He was promoted to research supervisor in 1952 and to assistant department head in 1955. During the 1953-1955 period, he was technical assistant to the president of the company in New York. Dr. Deming received his Ph.D. degree from the University of Wisconsin in 1943 and joined Shell that year in San Francisco. He held positions with Shell Chemical Corp. before coming to Emeryville Research Center in 1949 as administrative assistant to the vice-president, research.

We're not LI-ON...

...when it comes to carbon blacks. For quality, uniformity and service, Witco-Continental Carbon Blacks offer more for every dollar you spend.
Witco Chemical Company, Inc. · **Continental Carbon Company,**
122 East 42nd Street, New York 17, N. Y.

A Growing Source of Chemicals for Industry

Chicago • Boston • Akron • Atlanta • Houston • Los Angeles • San Francisco • London and Manchester, England



ENJAY BUTYL

in new coating—makes old roofs new at ⅓ the cost!

Butyl Rubber Roof Coating—sold by Montgomery Ward—gives worn-out asphalt shingle or roll roofs up to fifteen extra years of life at one third the cost of re-roofing with asphalt shingles. This amazing coating is made by Custom Polymers, Inc., with weather-resistant Enjay Butyl. Applied with a brush or roller, it forms a strong leak-proof surface that will not crack in the hot sun, or become brittle in freezing temperatures. Tough, low-cost Enjay Butyl is the right rubber for many other applications. Find out how it can help you make better products.

For complete information...
write or phone your nearest Enjay office. Enjay's extensive laboratories and expert staff are always glad to provide technical assistance.

EXCITING NEW PRODUCTS THROUGH PETRO-CHEMISTRY

ENJAY COMPANY, INC.
15 West 51st Street, New York 19, N. Y.
Akron • Boston • Charlotte • Chicago • Detroit • Los Angeles • New Orleans • Tulsa

ENJAY® BUTYL

Visit us at the ACS Meeting in Los Angeles, May 12-15th

M. I. T. Offers Summer Program

► Massachusetts Institute of Technology will offer a two week special summer program, to take place from July 20 to July 31, 1959, on "Materials for Parachute and Retardation Devices." The program is designed to complement the special summer course on parachute and retardation engineering given at the University of Minnesota during July 1958. The subject matter to be presented relates principally to the properties of those materials which have been used successfully in retardation devices or those which show potential advantages in meeting the increasingly severe requirements of future aerial recovery systems.

The program will be under the supervision of Dr. Stanley Backer, associate professor of mechanical engineering at M. I. T. He will be assisted by Professors E. R. Schwarz, M. E. Shank and H. M. Morgan of the Institute's Mechanical Engineering Department. Professor Helmut Heinrich of the University of Minnesota will lecture on materials requirements imposed by parachute design and special guest lecturers will cover various fields of materials specification.

Lecture topics will provide a survey of the properties of materials such as synthetic organic fibers, metallic fibers and other inorganic fibers, plastic film, ceramics and combinations of metals and non-metals. Specific subjects to be discussed include static mechanical properties; general rheological behavior; behavior under impact loads; resistance to repeated loads; and high temperature characteristics, including stiffness, strength and susceptibility to corrosion.

Full consideration will be given to problems of fabricating fiber or sheet forms into more complex structures such as are used in retardation devices. Structural efficiencies of twisted, woven, bonded and sewn systems will be treated analytically and predicted values compared with experimental data when available. Interactions between the basic "materials properties" and the structural design of the "materials subassembly" will be dealt with in detail. Materials specification will be considered in light of the requirements set by current parachute research.

Kaiser Names Rosener

► Kaiser Aluminum & Chemical Sales Inc., Oakland, Calif., has appointed A. L. Rosener, Jr., as technical superintendent for its electrical wire and cable plant at Bristol, R.I. Mr. Rosener was graduated from Lehigh University in 1948 with a B.S. degree in chemical engineering. For the next three years, he was assistant to the technical superintendent at General Cable Corp. Prior to joining Kaiser he was employed by John A. Roebling's Sons Corp. as process development engineer in charge of development, process and quality control on rubber covered electrical cables.

Firestone Plantations Appointments

► James E. Faulkner and A. G. Lund have been named vice-presidents of the Firestone Plantations Co., a subsidiary of the Firestone Tire and Rubber Co., Akron, Ohio. Mr. Faulkner will remain at the Akron headquarters and Mr. Lund will be headquartered at the company's rubber plantations in Liberia. Mr. Lund has also been named president of the United States Trading Co., a Firestone subsidiary which operates throughout Liberia, while John J. Verboom has been appointed vice-president of the trading company.

Mr. Faulkner, who has been with Firestone since 1943, has served the organization in various capacities both in Liberia and Akron. Since 1956, he has been manager of the Plantations Division. He also serves as secretary to the United States Liberia Radio Corp. and assistant treasurer of the United States Trading Co. Mr. Lund joined Firestone in 1942 in the Auditing Department of the Gun Mount Division. He has held several posts since then and last year he became general manager of the Plantations Company in Liberia. Mr. Verboom joined the Plantations Company's Supply Department in Liberia in 1939 and remained there until 1948. He returned in 1949 and is now in charge of supply for both the Plantations Company and the United States Trading Co.

Woods Resigns as President

► Commercial Solvents Corp., New York, N. Y., has announced the resignation of J. Albert Woods as president and director of the corporation. He will continue to serve the company in a consultative capacity until the end of 1962. The company also announced that Maynard C. Wheeler, senior vice-president, has been elected acting president. In addition, three directors, William E. S. Griswold, Sr., Henry V. B. Smith and James A. McConnell, whose terms expire this year, have announced that they are not candidates for re-election. The directors nominated Paul V. Shields, H. V. Sherrill, partners of Shields & Co., investment bankers; Arthur E. Palmer, Jr., partner of Winthrop, Stimson, Putnam & Roberts, attorneys; Jeremiah Milbank, Jr.; and William W. Burch, financial advisor to the Milbank interests, to serve as directors for the three year term ending 1962.

Oliver Tire Names Three

► Oliver Tire & Rubber Co., Oakland, Calif., has announced the appointment of C. C. Corkadel as plant manager of its tread rubber plant at Flemington, N. J. The company also has announced that Ralph T. Hickcox, formerly technical director, has been named technical assistant to the president, and Russell D. Kettering, formerly manager of manufacturing, has been appointed manager of technical service.

IMMEDIATE SHIPMENTS
from inventory!

JEFFERSON CHEMICAL
N-METHYLMORPHOLINE
N-ETHYLMORPHOLINE

for
catalysts in
POLYURETHANE FOAMS...

extraction solvents; stabilization agents for chlorinated hydrocarbons; preparation of self-polishing waxes, oil emulsions, corrosion inhibitors, and pharmaceuticals.

These alkyl morpholines are AVAILABLE WITHOUT DELAY in 55-gallon steel drums, 420 pounds net weight. For complete sales and physical property information, contact your nearest Jefferson representative or write directly to Jefferson Chemical Company, 1121 Walker Avenue, Houston 2, Texas

Look for other Jefferson Chemicals of high interest to the POLYURETHANE INDUSTRY to be announced soon.

JEFFERSON CHEMICAL COMPANY, INC.
HOUSTON • NEW YORK • CHICAGO
CLEVELAND • CHARLOTTE • LOS ANGELES

130

Obituaries

Luigi Emanueli

► Luigi Emanueli, vice-chairman of the board of Pirelli, S.p.A., died in Milan, Italy, on February 17 after a brief illness. He was 76 years old. Mr. Emanueli, who was born in Milan, studied electrical engineering at the Milan Polytechnic Institute. After graduation, he entered the Pirelli organization, where he was employed in experimental research activities. In 1911, after designing a measuring bridge for the purpose, he began to measure dielectric losses in cables and was the first to discover the phenomenon of ionization. He designed and supervised the construction of the first length of oil filled cable, known as the "Emanueli Cable," in 1918.

In 1919, Mr. Emanueli designed an aerial telephone cable which Pirelli put into service between Milan and the Hydroelectric Power Station in Grossoto. He also designed the submarine telephone cables laid between Sardinia and Continental Italy in 1913. More recently, he directed the design and manufacture of the submarine telegraph cable suitable for great ocean depths, which was laid in early 1953 between St. Vincent (Cape Verde) and Recife in Brazil. Mr. Emanueli was placed in charge of Pirelli's Rubber Tire and Technical Goods Divisions in 1944, and in 1954 he became vice-chairman of the board of directors, in which office he continued until his death.

For a number of years, Mr. Emanueli was chairman of the Associazione Elettrotecnica Italiana and an honorary member of the Societe Francaise des Electriciens. In the fall of 1958, he was elected to honorary membership in the American Institute of Electrical Engineers and a short time before his death, the Institution of Electrical Engineers in London awarded him the Faraday Medal.

Alvin D. Miller

► Alvin D. Miller, president of Firestone Synthetic Rubber & Latex Co., a division of the Firestone Tire & Rubber Co., Akron, Ohio, died on December 5 in Akron General Hospital, after suffering from complications caused by a heart condition. He was 46 years old. Born in Akron, Mr. Miller received a B.A. degree in liberal arts from Capital University in 1935, and afterwards, took evening courses leading to a B.S. degree in chemical engineering from the Case School of Applied Science, which he received in 1940.

Mr. Miller started with the company as a laboratory technician in 1933 and became a chemist in the experimental testing laboratory in 1940. A year later, he moved to the Synthetic Division as a chemical engineer and became chief chemist of that division in 1942. In 1943, he was named technical manager and in 1955, he was appointed general manager. He played an important part in the establishment of Firestone's large petrochemical center in Orange, Texas, where the company's production of butadiene was begun last summer. Mr. Miller was a member of the American Institute of Chemical Engineers, the American Chemical Society, the Akron Rubber Group, the Society of Professional Engineers, Alpha Chi Sigma and Tau Beta Pi. Surviving are his wife, three sons and a daughter.

William A. Herron

► William A. Herron, president of Herron Brothers and Meyer, New York, N. Y., died on March 20 at his home in New York City after a long illness. He was 73 years old. Mr. Herron attended the Lawrenceville School in Lawrenceville, N. J., and later, Princeton University, where he was a member of the class of 1908. From 1922 to 1936, he served as president and general manager of the Mountain Mill Paper Co. in Lee, Mass. Mr. Herron joined the firm of Herron and Meyer in 1936. When the structure of the organization was changed from a partnership to a corporation in 1948, he became president. Surviving are his wife and five daughters.

William H. Enell

► William H. Enell, director of advertising and public relations for the Paterson Parchment Paper Co., Bristol, Penna., died on November 26. He had suffered a coronary occlusion on October 31. Mr. Enell, who has been with Paterson since 1927, was active in many affairs of the paper business.

A. L. Viles

► Albert L. Viles, president of the Rubber Manufacturers Association, Inc., New York, N. Y., from 1935 until his retirement in 1954 and general consultant to that organization since that time, died on March 12 at New Rochelle Hospital, New Rochelle, N. Y. Born in Orland, Maine, Mr. Viles has been associated with the rubber manufacturing industry in the United States since 1919 and was widely known in both rubber producing and rubber consuming countries throughout the world. His business career in New York City began in 1910, when he was a special agent for the Official Classification Committee for the Eastern Railroads. In 1918, he became secretary and general manager of the Traffic Committee of the Rubber Association of America.

Mr. Viles served for four months in 1919 in reorganizing the Trunk Line Association's Weighing and Inspection Service for Eastern Railroads, returning to the Rubber Association of America in 1919, as secretary and general manager. In 1935, he was elected president of the successor organization, the Rubber Manufacturers Association, Inc. During the 1930's and until it was dissolved in World War II, Mr. Viles served as the U. S. Industry observer at meetings of the International Rubber Regulation Committee. He also served as an industry advisor to the U.S. representative at meetings of the International Rubber Study Group until 1953.

During World War II, Mr. Viles served as an advisor to the Rubber Reserve Corp. of the Reconstruction Finance Corp. He also served on industry advisory groups to the Defense Department, the Department of Commerce and the General Services Administration. Mr. Viles was an honorary member of the American Society of Association Executives and of the Automotive Old Timers, Inc. He was a member of the Union League Club, Wykagyl Country Club and was a knight of the Equestrian Order of the Holy Sepulchre of Jerusalem. For years, he was New Rochelle Hospital Association president and chairman.

Paul Weeks Litchfield

1875-1959

► Paul Weeks Litchfield, honorary chairman of the board for the Goodyear Tire & Rubber Co., Akron, Ohio, who was known as the "dean of America's rubber industry", died on March 18 at St. Joseph's Hospital in Phoenix, Ariz., where he had undergone surgery. He was 83 years old. During his lifetime, Mr. Litchfield became famous not only as an industrial leader, but also as an inventor, a humanitarian, a philosopher, a community builder, an author, and a pioneer, who was always ready to step forward . . . into the future.

Mr. Litchfield was born in Boston, Mass., and was educated in Boston public schools and the Massachussets Institute of Technology, from which he graduated in 1896 with a bachelor of science degree. Before joining Goodyear, he was associated with L. C. Chase & Co.; the Bath Iron Works; the New York Belting and Packing Co.; and the International Automobile and Vehicle Tire Co.

In 1898, Frank A. Seiberling organized the Goodyear Tire & Rubber Co., and in 1900 Mr. Litchfield joined the organization as a superintendent. He became a director of the company in 1906, factory manager in 1911, vice-president in 1915, first vice-president in 1923 and president in 1926. In 1930, he was also made board chairman.

Mr. Litchfield resigned from his presidential post in 1940, but continued as chairman and a member of the board until October 1958 and afterwards served until his death as a director of the firm.

Mr. Litchfield made his first notable contribution to the industry in 1902, when he brought out the "side-flange" tire, forerunner of the straight side tire. He also developed the modern, multiple cord tire and the first pneumatic tires adaptable to motor trucks and buses. The "Wingfoot Express", the first fleet of pneumatic tired motor trucks ever to be operated with the new tires, was established under his supervision.

The Goodyear "All-Weather Tread", with its diamond marking were developed by Mr. Litchfield in order to check skidding tendencies in any direction and afford maximum traction.

He also suggested and supervised the development of the "LifeGuard", a two-ply reserve tube within the tube which is inflated through the same valve.

The first American balloon industry was established by Mr. Litchfield, who supervised the building of hundreds of blimps and airships for the armed forces of the United States, including the U. S. S. Akron and Macon.

The Industrial Assembly and the Apprentice Farmer Project were the outgrowth of Mr. Litchfield's profound faith in mankind. He held firmly to the conviction that "You can't give a man anything—except opportunity to utilize his talents and knowledge to the fullest extent." His humanitarian instincts, however, found many other outlets.

He celebrated his fifteenth anniversary with Goodyear by making an outright gift of $100,000 to the Service Pin Association, composed of employes of over five years' service. Five years later, he added $50,000 to that gift and for many years presented a substantial amount annually to be spent for the benefit of Goodyear people not reached by ordinary charity or relief organizations.

In 1909, Mr. Litchfield started the Goodyear Relief Association and in 1910, he established its Labor Department. The year 1912 was marked by the establishment of a factory newspaper, a company hospital, an athletic field and Goodyear Heights, a reasonably-priced residential section which permitted thrifty workers to become home owners.

Mr. Litchfield's basic philosophies on business and life were set down in his books "Autumn Leaves", published in 1945, and "The Industrial Republic", published the following year. In 1954, he published his autobiography, "Industrial Voyage".

The entire industry attested to the fundamental truth of Mr. Litchfield's philosophies in December, 1958, when at a testimonial dinner more than 800 people gathered to pay homage to the man whose life had become so intricately interwoven with the industry he helped to build.

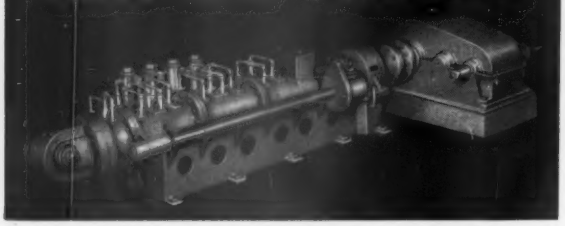
Following the death of Mr. Litchfield, J. P. Seiberling, president of the Seiberling Rubber Co., said of him, "With the passing of Mr. P. W. Litchfield it can truly be said that an end has come to an era in the rubber industry."

Portrait of Paul Weeks Litchfield which was shown at a testimonial dinner, held in his honor, on December 15, 1958.

PRODUCE BETTER RECLAIMED RUBBER IN YOUR COUNTRY

WITH THIS

NEW U. S. PROCESS



● Now, *you* can use this new process to produce BETTER Reclaimed Rubber FASTER and at LOWER COST!

RECLAIMATOR reclaims have more usable rubber hydrocarbon and are more completely devulcanized than conventional reclaims. They are softer, break down faster and disperse more quickly into the rubber base of a compound. Rubber reclaimed by this method remains plastic and does not age as much, or as rapidly, as old fashioned reclaims. These and many more advantages add up to a higher quality, lower cost rubber for both producer and user.

To learn how you can make BIGGER PROFITS with the RECLAIMATOR, simply write us a letter. Our 75 years of experience in the field are at your disposal.

Write for this **FREE BOOK**

Send for Reclaimator Book RR-20. Explains in great detail how RECLAIMATOR reclaims can benefit you in your industrial needs.

U.S.

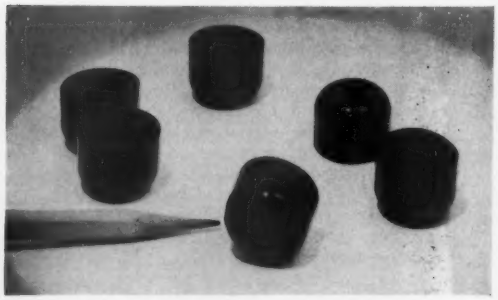
RUBBER RECLAIMING CO., INC.

P.O. BOX 365 BUFFALO 5, N. Y.

New Goods

Rubber Valve Stem Shield

► Ohio Rubber Co., Willoughby, Ohio, has developed a rubber valve stem shield for engines that prevents excessive loss of engine oil through the sliding fit of the valve in its guide, but still allows for adequate valve stem lubrication. The cup-shaped shield, made from "Chemigum N3", slips onto an engine valve stem and must have a



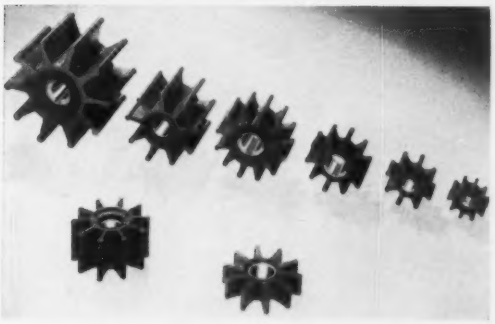
definite purchase, or clinging characteristic, since it must ride with the travel of the valve stem. Roughly 1-OD by 5/16-ID by 11/16-inches high, the new valve stem shield gives exceptional flexibility in assembly and in service. Job specification for the shield called for heat aging tests conducted at 250°F. for 70 hours and immersion tests in Numbers 1 and 3 grade oils were run for 70 hours at 300°F. Company officials said the severity of the test conditions was considered essential in assuring shields capable of resisting the hardening effects of high temperatures and of retaining pliability at low temperatures. The valve stem shields are continuous-molded to fairly critical tolerances of + or − 0.010-inch on all dimensions except the inside diameter which is held to + or − 0.0025-inch.

Flexite Rubber Bucket

► B. F. Goodrich Industrial Products Co., Akron, Ohio, has announced the introduction of the "Flexite Rubber Bucket," which features a new type safety handle that cannot be pulled loose. Attached with special stainless steel clips, the new stainless steel handle is said to stay locked in place, defying pull tests beyond the breaking point of the tough rubber buckets. The handle is a free-swinging but permanent part of the bucket structure and overcomes a common safety hazard in the handling of acids, corrosives and alkalies, the company states. The new safety handle is available in both hard and soft rubber bucket styles.

Flexible Rubber Impellers

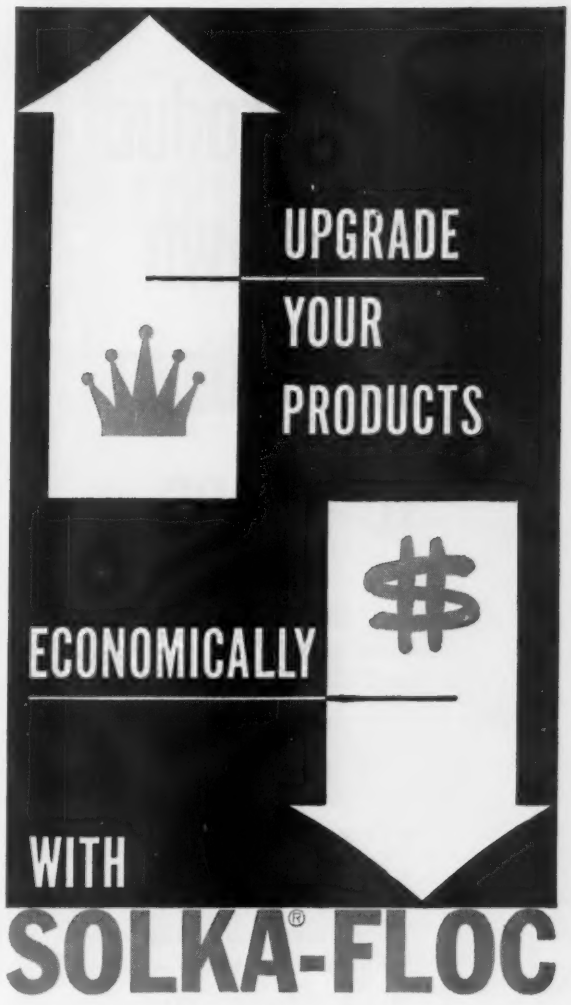
► Flexible rubber impellers for self-priming pumps, with a reported service life up to 1½ times longer than standard impellers, have been developed by Pacific Moulded Products Co., 905 E. 59th St., Los Angeles, Calif. According to the company, these new impellers combine advantages of high tensile strength, resistance to oxidation, compression set, abrasion and tearing



with designs engineered to increase life expectancy. The compounds of neoprene and Hycar are adaptable to handling a large variety of liquids at temperatures ranging from 40° to 175°F., according to a company spokesman. The company reports that the new compounds and designs enable a variety of applications such as marine, farm and agricultural, food processing, chemical and pharmaceutical, plumbing and air conditioning and other general industrial uses. Pacific impellers are available in standard or special sizes suitable for pumping capacities from ½ gallons per minute to 120 gallons per minute. They operate at speeds from 300 rpm through 6000 rpm, the company announced.

Dowel Mounted Toplift

► A new rubber toplift premolded to a steel dowel pin has been developed by the Missouri Heel Co., St. Louis, Mo. According to the company, the new lift, called "Silentstep", is designed to give women quiet, comfortable, jar-free walking even on needle heels. The company reports that the lifts are made of a secret patented rubber compound, which they developed, and are claimed to have long wearing qualities, plus excellent resilience for absorption of pavement and floor shock, and they are non-marking, with an abrasion test of over 600. The steel shaft is threaded for approximately one-half inch near the insert end, and original insertion in the heel is made under air pressure, the company states. Replacement by retailers or repair shops involves only unscrewing, which automatically cuts threading in the heel itself. Replacement is reported to be both quick and easy.



This finely divided highly purified wood cellulose has many applications. It can:

- **Lower cost**
- **Improve surface**
- **Reduce shrinkage, kill nerve**
- **Control dimensional stability**
- **Regulate hardness and flex life**
- **Aid processing**

Available in a wide range of grades to give special properties to a multitude of rubber and plastic end products such as rubber soles, floor tile, rubber toys, car floor mats, phonograph records, etc. Write us about your special process problems. Address Dept. FG-4, our Boston office.

BROWN COMPANY

150 Causeway Street, Boston 14, Mass.
Mills: Berlin & Gorham, New Hampshire

Sold in Canada by
Brown Forests Products, Ltd., Montreal, Que. (ALPHA-FLOC)

Your product is known by the brand it keeps

Does your product identification gradually wear off?

Is it . . .

- Hard to apply?
- Expensive?
- Hard to read?

Then investigate the *two* new methods of marking rubber products with brand—size—type—style.

New developments by one of the oldest companies in the field of product identification permit rubber products to be marked . . .

BEFORE CURE

or

AFTER CURE.

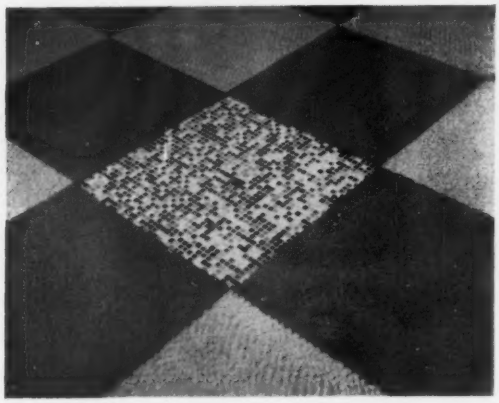
Write or phone for further information.

Kaumagraph COMPANY

Department T, Box 388
Wilmington 99, Delaware
Olympia 4-2461

Carpet On The Square

► A carpet cut in 18 inch square blocks—like tile—then backed with foam rubber and mounted on Masonite has been developed by Jaystron Corp., 1760 E. Market St., Akron, Ohio. One of the advantages that "Carpet on the Square" has over the conventional one-piece carpet is that a specific number of squares can be purchased to fit a specific room. Extra blocks may be used



as replacements or as spares for a move to larger quarters, the company states. Another advantage, according to Jaystron, is that squares can be rotated for maximum wear, or a square can be replaced if badly soiled, burned or worn.

The company claims that by purchasing carpet squares, color combinations can be had, eliminating the monotonous monotone of conventional carpeting. Color patterns can also be changed to suit later interior decorations. The company reports that anyone can install the square since no special tools or skills are needed. The squares can be installed on concrete or composition flooring as well as wood floors. Vinyl tile can be cemented to the interlocking Masonite base at the same height as the carpet so that a floor can be part vinyl or rubber surface and part carpet.

Heavy Duty Pail

► A new 18 quart molded rubber pail made with DuPont neoprene has been announced by Cauchotex Industries, Inc., 44 Whitehall St., New York, N. Y. Named "Fortex NPL 80-18", this pail is claimed to be especially designed to resist the strongest acids, gasoline, kerosine, jet fuels, oils, greases, brake fluid, paints, chemicals, and the like. The company states that the pail is molded in one piece and reinforced with fabric for added strength, there are no seams to split, it will not leak, crack or bulge. Because the pail contains neoprene it cannot crush, nor will it mar surfaces it is claimed.

The company states that the pail, which weighs

about six pounds, is guaranteed not to dent, chip or rust and will remain unharmed by severe weather conditions, extremes of heat or cold, and the molded round bottom eliminates corners where dirt can collect. The company claims it to be one of the safest pails ever made since it does not spark when scraped or dropped, making it useful around high octane fuels in automotive,

aviation, oil and other heavy industry. Since the strongest acids, soaps and detergents are said not to harm its rubber-fabric composition, it can also be adapted for use in chemical plants and for general utility use. Other features which add to the pail's usefulness are graduations in quarts and half gallons; its molded pouring lip and the rubber covered handle which is handy for carrying in freezing weather, the company states. It is also available in 10 and 12 quart capacities.

Rotary Drilling Hose

► A new rotary drilling hose, said to be the most flexible hose ever designed for deep drilling, has been developed by B. F. Goodrich Industrial Products Co., Akron, Ohio. According to the company, more than two miles of cable, made from 41 miles of high tensile strength wire, are spiralled inside every 60 foot length of the "Super Highflex" hose. Two plies of the extra heavy wire are reported to furnish muscle needed to withstand extreme bottom hole pressures, and seven plies of fabric add additional strength. The company reports that the resilient construction results in a crush resistant hose that recovers immediately from the effects of sudden shock or impact. Hose ends are enlarged to accommodate couplings of the same inside diameter as the hose, and ends are further reinforced with additional plies of wire and fabric to protect against bending stress at the couplings. Couplings are built-in, and do not move out of position even under the most severe operating conditions, the company states.

VULCANIZED VEGETABLE OILS

rubber substitutes

THE CARTER BELL MFG. CO.
SINCE
CARTER BELL PRODUCTS
1903
SPRINGFIELD, NEW JERSEY

Types, grades and blends for every purpose, wherever Vulcanized Vegetable Oils can be used in production of Rubber Goods— be they Synthetic, Natural, or Reclaimed.

A long established and proven product

THE CARTER BELL MFG. CO.
SPRINGFIELD, NEW JERSEY

Represented by
HARWICK STANDARD CHEMICAL CO.
Akron, Boston, Chicago, Los Angeles, Trenton, Albertville, (Ala.), Denver, Greenville, (S.C.)

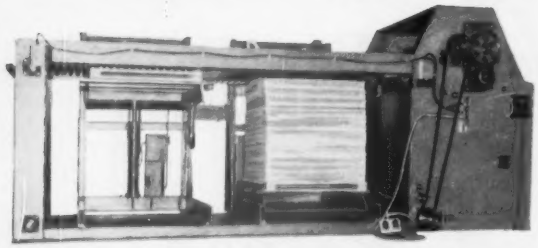
INCREASE PRODUCTION . . . DECREASE COSTS

With

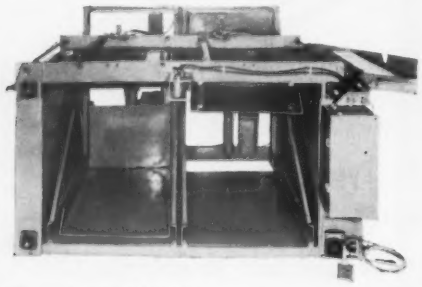
NEW HIGH SPEED

Automatic

Cutting and Stacking Units

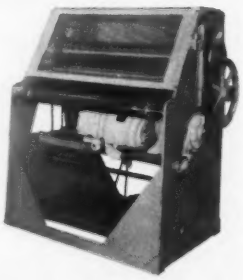


These highly efficient machines are furnished separately or as a complete self-contained unit for automatic cutting and stacking of materials from extruders, mills, calenders, and other processing lines. The Alfa Rotary Cutter is complete with a variable drive for automatic synchronization to the material speed, and length of cut can be easily and infinitely adjusted within the given range. Alfa Stackers are available with single or double stacking units. They accommodate a wide variety of materials and stack on lowering skids that are easily handled by fork truck.



CUTTING and STACKING FEATURES . . .

- Blades easily adjusted to micrometer exactness
- Cuts and stacks at speeds up to and exceeding 100 ft./min.
- Handles material widths from 24" to 50"
- Cuts lengths from 24" to 60"
- Stack per skid 40" high, max. skid load 4000#

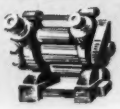


SPADONE MACHINE CO. INC.

SOUTH NORWALK, CONNECTICUT Phone: VOlunteer 6-3394

Representative for Alfa Machine Co.

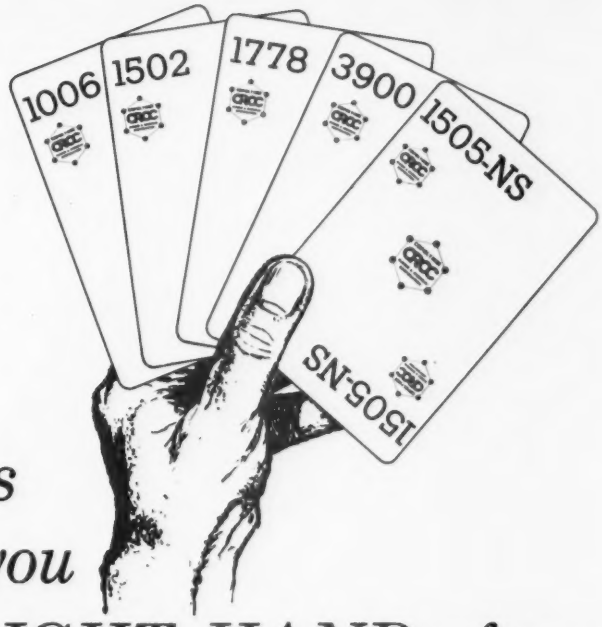
New Equipment



Almco Tumbling Machines

► A series of eight new refrigerated tumbling machines specifically designed for deflashing and finer finishing of molded rubber parts has been announced by Almco, Queen Products Division, King-Seeley Corp., Albert Lea, Minn. The machines, which use CO_2 as the refrigerant, are said to enable precision, production-line barrel finishing of molded parts of almost any size or shape, and to eliminate hand trimming of flash and rind from rubber parts. The liquid injection method is fully automatic, the flow being controlled by a solenoid valve and the amount governed by thermostat and timer. The automatic thermostatic temperature controls regulate temperatures down to —100°F. A timer is provided which indicates by signal light when more CO_2 is needed, while a barrel timer controls the length of the tumbling operation.

The eight models range in size from 3.7 to 30.7 cubic feet barrel capacity. The hexagon-shaped barrels have 3-inch thick insulation, stainless steel liners and doors with a special, low-temperature gasket. All models feature variable barrel speed from 10 to 30 rpm. Over-all cabinet size ranges from 47-inch long x 40-inch wide x 64-inch high up to 71 x 58 x 78-inch dimensions. Power requirements are from ½ to 3 hp. The barrel is mounted in extra heavy duty bearings and is driven from the motor through hardened steel roller chains and sprockets. The drive motor is equipped with a disc type magnetic brake to guarantee positive positioning of the barrel.



Let us give you the RIGHT HAND—for your

NON-STAINING PRODUCTS

TYPE	DESCRIPTION AND USE
COPO 1006	"Hot", General Purpose Polymer. Used in white sidewalls, floor tile, wringer rolls, etc.
COPO 1502	"Cold", General Purpose Polymer. Used in white sidewalls, floor coverings, shoe soles and heels, etc.
COPO 1778	"Cold", General Purpose Polymer Extended With Highest Grade Non-Staining Oil. Used in products where color stability is demanded at minimum cost.
⬡ COPO 3900	"Cold", Special Purpose Polymer Extended With 25 PHR Highly Purified Wood Rosin. Improves building tack, flex life and compression set. Used in floor tile, shoe soles and heels, appliance and drop cord, molded and extruded mechanical goods.
⬡ COPO 1505-NS	"Cold", Special Purpose Polymer With Low Bound Styrene Content. NOW NON-STAINING. Used in products where low-temperature serviceability is required.

⬡ A COPOLYMER EXCLUSIVE

IT'S A CINCH WE CAN HELP YOU! CALL US!

SALES OFFICES:

Chicago, Illinois	Sycamore	8-8957
Akron, Ohio	Walbridge	8-3226
Hartford, Connecticut	Chapel	7-5731
Philadelphia, Pennsylvania	Rittenhouse	6-4663
Atlanta, Georgia	Plaza	3-1534

MAIN OFFICE:

Baton Rouge, Louisiana	Elgin	5-5655

COPOLYMER CRCC RUBBER & CHEMICAL CORPORATION

COPOLYMER RUBBER & CHEMICAL CORPORATION

BATON ROUGE 1, LOUISIANA

it's what
it doesn't have
that makes it good!

National® ANILINE

What doesn't our aniline have that makes it so good?

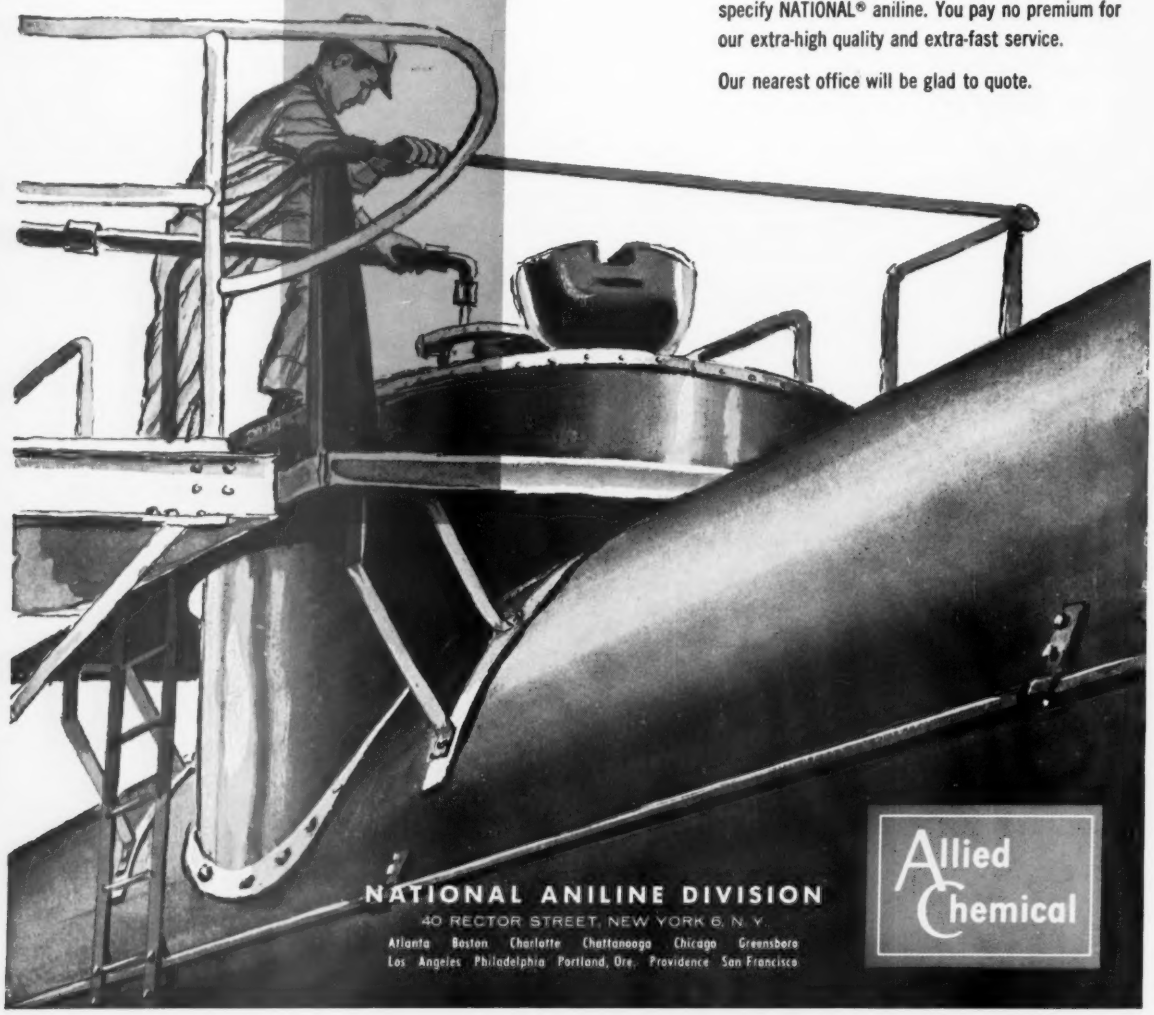
It has very little moisture (4/100 of 1% maximum).

It has very little color (Barrett Standard 1.0).

It has very low total impurities. (Our shipping spec is 99.9% but we regularly load cars analyzing 99.95+% That's better than ACS CP aniline specs).

So if you want clear, colorless, nearly dry, high-purity aniline shipped by tank car or tank wagon from Moundsville, West Virginia, on 24-hour notice, specify NATIONAL® aniline. You pay no premium for our extra-high quality and extra-fast service.

Our nearest office will be glad to quote.



NATIONAL ANILINE DIVISION
40 RECTOR STREET, NEW YORK 6, N. Y.
Atlanta Boston Charlotte Chattanooga Chicago Greensboro
Los Angeles Philadelphia Portland, Ore. Providence San Francisco

Allied Chemical

with **ALAMASK®**

subtract rubbery odors... sweeten sales

Sure, you make comfortable mattresses, sturdy hoses, bouncy balls...what else can the customer want? *She wants a totally pleasant product image.* Alamask re-odorizing chemicals help build a pleasant product image by removing sales-discouraging rubbery odors in any natural or synthetic rubber product. Customers are quicker to pick up and buy your rubber products if they look good, work well *and* smell nicer than others.

Which of your rubber products do you want to smell better: **DRY RUBBER:** natural, synthetic, reclaim, chemically blown. **LATEX:** foam, sponge, dipped goods, bonded fibers, adhesives. **ELASTOPLASTICS:** polyvinyl, polyaryl, plastisols. There are specific Alamask treatments for these and other rubbers. Write or phone now for Alamask samples and technical application data for *your* products.

Alamask, for essential industries with non-essential odors.

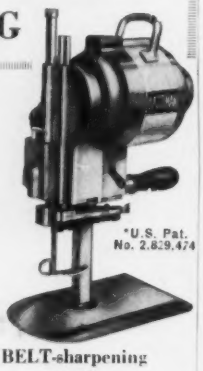
RHODIA INC.

60 East 56th Street, New York 22, N. Y. (Phone: Plaza 3-4850)

Representatives in:

Philadelphia • Cincinnati • Chicago • Los Angeles • Denver • Montreal • Mexico City

It's EASTMAN
for QUICK, EASY, ACCURATE
RUBBER CUTTING



- All types of Rubber —cured and uncured
- All types of Coated materials
- Rubber Sheeting and Slabs

New! EASTMAN KNIFE-SAVER*
35% Longer Blade Life!

*U.S. Pat. No. 2,829,474

Special knife edges — sawtooth, wave-edge, etc. — and knife moistening device make cutting easy.

ONLY Eastman automatic BELT-sharpening can sharpen these knives correctly.

EASTMAN "LIGHTNING"
for cutting straight lines and easy curves. Automatic sharpening renews knife while machine is cutting.

Strip-Cutters and Skivers also available. Send for Circular
Representatives everywhere

EASTMAN MACHINE COMPANY, BUFFALO 3, N. Y.

AMES

...the preferred Dial Comparators...

No. 2W Dial Comparator

Dimensional checking is fast, easy and accurate with Ames Dial Comparators. You get definite, impersonal readings right from the dial. There's no guesswork or figuring.

Special comparators are available for measuring all forms of rubber and plastic. Write today for complete information.

Representatives in principal cities

B.C. AMES CO.
38 Ames Street, Waltham 54, Mass.

MANUFACTURERS OF MICROMETER DIAL GAUGES • MICROMETER DIAL INDICATORS

Atlas Series 200 Presses

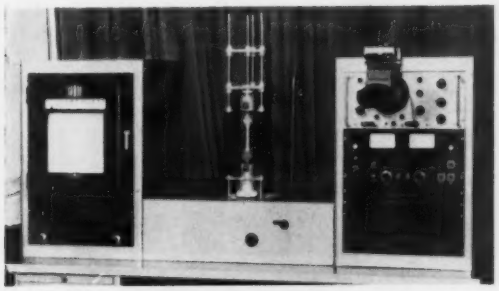
► The new Series 200 Atlas hydraulic presses features units which have been especially designed for extremely accurate control in research and

testing. Precise tolerances are said to be maintained in molding rubber due to the new ultra heavy frame. Platen sizes range from 12 x 12-inches to 24 x 24-inches. The entire press frame, which is built with slab sides, is constructed for maximum rigidity and minimum head deflection. Precision 45 degree adjustable bronze guides are claimed to provide accurate platen alignment. Platens are available with steam or electric heating and water cooling. Design modifications are available to suit customer requirements. The manufacturer is Atlas Hydraulics, Inc., 3576 Ruth St., Philadelphia 34, Penna.

Plastechon High-Speed Tester

► A high speed testing machine, designated the Plastechon, is said to be an ideal research tool for studying elastomeric materials in order to obtain ultimate strength properties, energy absorption and dissipation characteristics, and differences between materials which appear to be identical under static-loading test conditions. Manufactured by Plas-Tech Equipment Corp., 751 Main St., Waltham, Mass., the tester is also useful as a quality control unit for rubber production, processing and end-item evaluation. In comparing polymers it is helpful in differentiating between materials of different molecular weight distribution, plasticizer and filler concentrations, and degrees of cross-linking. The Plastechon consists of two component assemblies: a pneumatically actuated tester, and

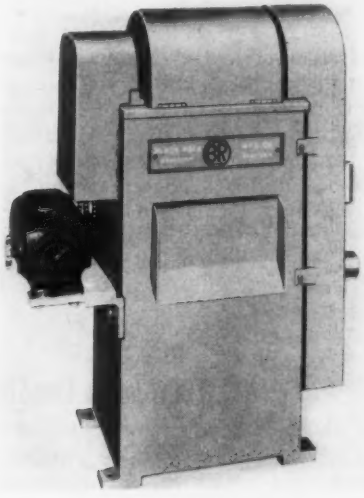
an electronic measuring system. Stress-time or stress-strain curves in the millisecond range are picked up on an oscilloscope and recorded on film.



Longer term stress-relaxation phenomena are measured on a strip chart recorder. The equipment is housed in a console unit to provide an integrated working area for efficient operation.

Black Rock Rubber Band Cutter

► The Black Rock rubber band cutter, a machine designed to cut infinitely variable rubber band widths without the necessity of having a special pair of gears for each width cut, is built and marketed by Black Rock Manufacturing Co.,



189 Osborne St., Bridgeport, Conn. Known as Model RBC, the machine is equipped with a unit to precisely control individual width cuts. Changes in band widths can be made while the machine is in operation. Equipped with three revolving knives and one stationary knife, the RBC is said to cut widths with remarkable accuracy from 1/16 to 1-inch while making from 600 to 1800 cuts per minute. The cutter is said to easily handle rubber stock thicknesses to 5/16-inch.

BE CAREFUL ABOUT
TEMPERATURE

REJECTS ARE A TOTAL LOSS!

There is very little you can do with scorched rubber except charge it off to experience. Even with the rapid modern accelerators, scorching is avoidable. With the Cambridge Surface Pyrometer, the operator can check, thus control the surface temperature of mill, warming and calender rolls. It is an accurate, rugged, quick-acting instrument, so easy to use that operators are glad to use it.

Combination and single purpose instruments

Send for bulletin 194 S4

CAMBRIDGE INSTRUMENT CO., INC.
3503 Grand Central Terminal, N. Y. 17, N. Y.
Pioneer Manufacturers of Precision Instruments

CAMBRIDGE
ROLL • NEEDLE • MOLD
PYROMETERS

THEY HELP SAVE MONEY AND MAKE BETTER RUBBER

DPR®
DEPOLYMERIZED RUBBER
NATURAL CRUDE RUBBER IN LIQUID FORM 100% SOLIDS
AVAILABLE IN HIGH and LOW VISCOSITIES
DPR, INCORPORATED
A Subsidiary of H. V. HARDMAN CO.
571 CORTLANDT STREET
BELLEVILLE 9, N. J.
DPR TRADE MARK

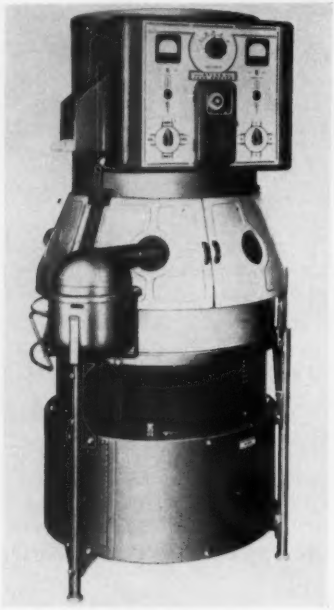
We specialize in the construction of hydraulic presses, either bench or floor, for every purpose in the fields of rubber and plastic moulding, laboratory testing and graphic arts. Write for circular.
Complete line of Standard Presses: will modify to suit your need.

P·H·I PRESS

PASADENA HYDRAULICS INC.
1433 Lidcombe, El Monte, California

Atlas Fade-Ometer

► A new Fade-Ometer, Model FDA-RC, has been introduced by Atlas Electric Devices Co., 4114 North Ravenswood Ave., Chicago 13, Illinois. The unit is equipped with an electrically



operated atomizer and cycle meter designed to permit it to be operated either under conditions simulating the cycling effects and high humidity conditions encountered in the daylight exposure method, or under conditions which permit good correlation with the sunlight exposure method where the samples are exposed to sunlight between 9 a.m. and 3 p.m. Machines now in use can be converted into the new model by the addition of new features.

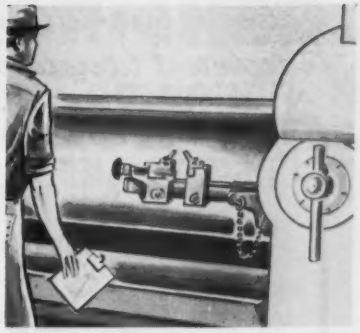
OPW-Jordan Line Strainers

► New aluminum line strainers to protect and prolong the life of pumps, meters, loading valves and mechanical equipment are available from OPW-Jordan, 6013 Wiehe Road, Cincinnati 13, Ohio. The strainers are available in ¾ through 4-inch sizes screwed ends, and 2½ through 4-inch 125 pound ASA flanged ends. They are supplied with standard bronze 14 to 80 mesh woven screens, with 100, 200 and 300 mesh screens available. Weighing only one-third as much as cast iron strainers, the aluminum strainers are said not to rust and to be highly resistant to the corrosive effects of industrial atmospheres. They are suitable for pressures to 75 psi and temperatures to 250°F.

Accurate, Cleaner-Cut Strips...

with new fold-away Goodman Mill Strip Cutter

Don't be satisfied with hit-or-miss dimensions, rough or beveled edges, on your stock stripping. The Goodman Rubber Mill Strip Cutter is specially designed for precision requirements of stock feeding to another mill, extruder or lay up machine. A built-in micrometer knob assures exact control over stock width. The toolsteel blades produce a clean, square-edged strip, and are easily sharpened. And, for *maximum safety*, the whole unit swings up, holding blades against the mill frame completely out of the operator's way. Models are available for mounting on right or left frames, for all 42"-48"-54" or 60" two roll mills. Write today for illustrated bulletin.



G. F. GOODMAN & SON

401 Richmond Street, Philadelphia 25, Pa.

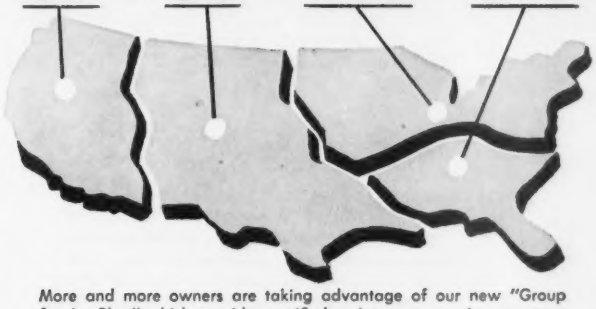
Sales Representative:

RALPH B. SYMONS ASSOCIATES, INC.

3571 Main Road, Tiverton, Rhode Island

Unit folds up, holding blades safely out of way.

67 + 80 + 618 + 513 = 1278



Scott Testers Received Field Service by SCOTT Service Men During 1958

More and more owners are taking advantage of our new "Group Service Plan" which provides certified maintenance service at a very reasonable cost.

For your Scott Testers, insist on servicing with latest factory know-how and techniques . . . which only Scott field men can provide. We are as near as your telephone.

Providence
DExter 1-2853

Spartanburg
Spartanburg 3-6571

SCOTT TESTERS, INC.

85 Blackstone St., Providence, R. I.

Representatives in Foreign Countries

New Symbol of World Standard Testing

Filling a long-felt gap in technical literature

RUBBER

fundamentals of its science and technology

DR. JEAN LE BRAS
French Rubber Institute

translated by
IRENE E. BERCK, Ph.D.
Editor, Chemical Publishing Co., Inc.

460 pages • illustrated • 1957 • $12.00

This is the first book ever published which thoroughly covers the entire rubber industry, including synthetic elastomers, latices of both natural and synthetic rubbers, and even the pertinent plastics, in less than 500 pages.

It is written especially for the busy rubber chemist and technologist, beginner and student, who have no time to untangle the details they really need from a maze of compiled literature.

Utility is the keynote of the book. With judicious selection from the latest developments in rubber chemistry and physics, theories of elasticity, vulcanization, accelerators, reinforcement, antioxidants, etc., and the most up-to-date procedures of rubber technology and testing, it provides a well-balanced, concise but comprehensive treatise on this vital commodity.

Special attention is given to the principles of selecting the most suitable compounding ingredients to meet the specifications placed on the finished product.

Check These Features

- Up-to-date A to Z coverage
- Balanced theory and practice
- Instructive illustrations
- Comparative evaluation of natural and synthetic rubbers
- Simple and lucid style
- Time-saving index

RUBBER AGE
101 West 31st St., New York 1, N. Y.

Please send me .... copy(ies) of "Rubber—Fundamentals of its Science and Technology" at $12.00 each.

☐ Payment Enclosed ☐ Bill Me

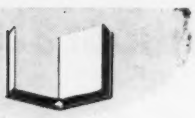
Name .....

Address .....

.....

add 3% for New York City Addresses

Reviews



The Rise of the British Rubber Industry During the Nineteenth Century. By William Woodruff. Published by Liverpool University Press, 123 Grove St., Liverpool 7, England. 5½ x 9 in. 246 pp. 35s (approximately $5.00).

The author of this book tells one of the chapters from the remarkable story of the rubber industry during the last hundred years—that of the origins and rise of rubber manufacture in the West Country of England during the second half of the nineteenth century. Much of what he has to say also pertains to the beginnings and development of the industry as a whole in Great Britain, though that story remains still to be told in its entirety.

The writer had at his disposal heretofore unpublished papers and documents of the Moulton Co., founded at Bradford-on-Avon in 1848. In addition, he has made use of records of the Macintosh Co., dealing with the rise of the industry in the northwestern region of England since 1824; the North British Rubber Co. of Edinburgh, founded by a group of American industrialists in 1856, and the Avon India Rubber Co.

A principal role in laying the foundations of rubber manufacture in England's West Country was played by Stephen Moulton, and much of a biographical and historical nature concerning this pioneer and his company are included. In fact, his was the vital part, and the theme of the book is his efforts, along with those of other less dominant pioneers, in laying the foundations of rubber manufacture in the West Country.

The author, limiting himself both in time and place, has written the complete story of one small segment of the general economic history of our industry. Many of his chapters—those on manufacture, markets, work and wages, for example—tell of things which were universal in practice during the time with which he deals, so that much of what he has to say pertains to the lore of rubber. One illustration shows a calender constructed for Stephen Moulton in 1849, probably the first such machine ever manufactured in the United Kingdom. It is only one of the many fascinating items from the yesterday of our industry.

•

Chemistry Made Easy. By Cornelia T. Snell and Foster D. Snell. Published by Chemical Publishing Co., Inc., 212 Fifth Ave., New York 10, N. Y. 5¼ x 8¼ in. 688 pp. $10.00.

This book on chemistry is designed specifically for home study and so presented as to make it easy for the reader to grasp the essential principles of the science by himself without a teacher. It covers the three main branches of chemistry: general, inorganic and organic. The book is divided into three parts, one for each. Each part includes over twenty chapters filled with the information, chemical equations, tables and illustrations necessary to give a well-rounded picture of the science.

The authors have chosen a simple and enjoyable style of writing to convey the great amount of information which must be presented in a survey of an entire science. This is commendable, for there is no reason why even theory and underlying principles of chemistry cannot be presented in a readily comprehensible manner.

Anyone who has no technical or scientific education will gain a working knowledge of chemistry fundamentals by reading this book. In addition, it can serve as a refresher and ready reference for those who need chemical information in their everyday work.

1958 Book of ASTM Standards—Part 9: Plastics, Electrical Insulation, Rubber, Carbon Black. Published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3, Penna. 6 x 9¼ in. 2018 pp. $14.00.

The Book of ASTM standards is a triennial publication with supplements issued in the intervening years. It contains the formally adopted ASTM Standards and Tentative Specifications, Methods of Test, and Definitions. The 1958 edition comprises over 13,500 pages, and has been issued in ten parts. Part 9, which appeared in December of last year, contains the specifications and methods of test for rubber and carbon black among other materials.

The section on rubber, which occupies some 675 pages, is divided into parts on the following: Processibility Tests, Chemical Tests, Physical Tests, Aging and Weathering Tests, Low Temperature Tests, Automotive and Aeronautical Rubber, Packing and Gasket Materials, Hose and Belting, Tape, Electrical Protective Equipment, Rubber-Coated Fabrics, Insulated Wire and Cable, Hard Rubber, Latex Foam, Sponge and Expanded Cellular Rubber, Rubber Adhesives, Crude Rubber, Rubber Latex, Synthetic Elastomers, Rubber Compounding Materials, and Electrical Tests.

The section on carbon black contains parts on chemical tests, physical tests and on an optical test.

The physical layout of the book meets all the requisites which one demands of such an encyclopedic volume. The standards are assembled in a sequence determined by the specific materials or products to which they apply. The type is clear, the paper of good quality, and the diagrams, illustrations and tables readily legible. The table of contents is presented in two parts—one a list of the standards classified according to the materials covered, the other, printed on colored stock, a list of the standards in numeric sequence of their serial designations. A subject index of the standards and tentatives in the volume appears at the back.

The Society has maintained the standard of editorial craftsmanship and thoroughness which it has achieved in similar volumes in the past. It is to be congratulated on the continuing high quality of its endeavors.

•

Radioisotopes: A New Tool for Industry. By Sidney Jefferson. Philosophical Library, Inc., 15 East 40th St., New York 16, N. Y. 5 x 7½ in. 110 pp. $4.75.

This book, written by the leader of the Technological Irradiation Group, Isotope Division, Harwell, England, provides insight for the businessman and the layman into the many ways in which industry has benefited, and can benefit in the future, from the use of radioactive materials. The development of radioisotopes for industrial application has progressed rapidly during recent years, and the volume fills a conspicuous gap on the bookshelf in explaining clearly and succinctly their commercial applications.

The first part of the book is devoted to industrial applications. Individual chapters discuss radioactive markers, detection of leaks, checking the thoroughness of mixing, thickness measurements and other subjects. The vulcanization of rubber by radiation is described briefly, and advantages of the method over conventional ways are detailed. The second section of the book, which contains four chapters, deals with "Elementary Fundamentals of Radioactivity." This section offers a basic but comprehensive discussion of the technology connected with the new field of radiation.

This is a valuable book for the layman in this period of rapidly expanding radiation technology with all the implications of its impending effect on the commercial world.

EAGLE-PICHER
Lead & Zinc Compounds
meet the specific demands of the rubber industry . . .

Eagle-Picher manufactures a comprehensive line of both lead and zinc compounds for the rubber industry. Rigid product control is maintained from the ore to the finished product. More than a century of experience assures you of customer service unequalled in the field.

Zinc Oxides
Basic White Lead Silicate
Basic Carbonate of White Lead
Sublimed White Lead
Litharge
Sublimed Litharge
Red Lead (95% 97% 98%)
Sublimed Blue Lead

EAGLE EP PICHER
THE EAGLE-PICHER COMPANY
Since 1843
General Offices: Cincinnati 1, Ohio

West Coast Sales Agent
THE BUNKER HILL COMPANY, Chemical Products Division
Seattle • Portland • Oakland • San Francisco • Los Angeles • Kellogg, Idaho

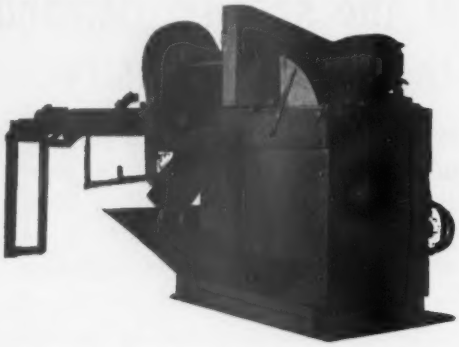
for highest quality of grind...

DAY 3-ROLL MILLS

Built in 14"x 30", 10"x 22", 5"x 12", 4"x 8" sizes. Write for Bulletin 158.

The J. H. DAY Co.
Division of The Cleveland Automatic Machine Co.
4918 BEECH STREET, CINCINNATI 12, OHIO

SLICER MACHINE
for
EXTRUDED STOCKS



Capacity Section up to 4" OD or 4x6" flat stock.
Length 1/8" to 8".
Cuts per minute 25 to 200.
Automatic Feed and Circulating Pump.
Made in three sizes.

UTILITY MANUFACTURING COMPANY
Cudahy, Wisconsin
Write Today for Complete Information

BOOKS for Technical Men
Available from **RUBBER AGE**
101 West 31st St.
New York 1, N. Y.

LATEX IN INDUSTRY
by Royce J. Noble
PRICE: $15.00* (postpaid-U.S.)

RUBBER---FUNDAMENTALS OF ITS SCIENCE AND TECHNOLOGY
by Jean Le Bras
PRICE: $12.00* (postpaid-U.S.)

AGEING AND WEATHERING OF RUBBER
by J. M. Buist
PRICE: $4.00* (postpaid-U.S.)

ANNUAL BIBLIOGRAPHY OF RUBBER LITERATURE: 1949-1951 EDITION
PRICE: $7.50* (postpaid)

CHEMISTRY OF NATURAL AND SYNTHETIC RUBBERS
by Harry L. Fisher
PRICE: $6.50* (postpaid-U.S.)

MANUAL OF RECLAIMED RUBBER
by John M. Ball
PRICE: $3.00* (postpaid-U.S.)
** Add 3% for New York City Addresses*

BOOKLETS, CATALOGS, etc.

The Dispersion of Carbon Black in Rubber and Its Role in Vulcanizate Properties. By C. W. Sweitzer, W. M. Hess and J. E. Callan. Columbian Carbon Co., 380 Madison Ave., New York, N. Y. (Available from Instruments Division, Philips Electronics, Inc., 750 South Fulton Ave., Mount Vernon, N. Y.) 5½ x 7¾ in. 40 pp.

The text of this booklet reports studies of carbon black made with the electron microscope and contact microradiography by Columbian Carbon researchers. Among the subjects covered are: Dispersion Evaluation Methods, Factors Controlling Dispersion, Role of Dispersion in Vulcanizate Properties, Banbury Mixing Procedure, Remilling and Masterbatch Temperature. The booklet has many illustrations, including more than 50 micrographs. The material, which, of course, is of direct interest to the rubber technologist, has been assembled into a well designed and valuable publication.

•

Medoto per la determinzaione dei carichi applicabili a ruote portanti e pulegge con gola rivestita in gomma (Method for evaluating the load applicable to rubber-lined bearing and race pulleys). By Attilio Angioletti and Umberto Felice. Pirelli Co., Milan, Italy. 8½ x 11 in. 14 pp. (In Italian).

A study on the evaluation of loads applicable to rubberlined pulleys, is presented in this publication. The influence of temperature increase due to rotational speed is considered on the basis of prior results concerning the load admissible for fatigue resistance. The temperature rise is calculated with some approximations on the basis of hysteresis power losses and heat transmission in the lining. The calculation determines the coefficient of load reduction as a function of the pulley speed, the wheel and rope diameter and the temperature rise. The reliability of the calculation is confirmed by practical experiments.

•

Catalin—Chemicals, Resins, Plastics. Catalin Corp. of America, One Park Ave., New York 16, N. Y. 8½ x 11 in. 12 pp.

This illustrated booklet describes the plants, facilities and major products of Catalin. Antioxidants and a number of other chemicals are discussed, as are both thermosetting and thermoplastic resins. Information is also given on various formulations and grades of styrene, nylon and polyethylene plastics. A description of the company's laboratories where scientists and technicians delve into problems of basic research, new product development, standard product improvement and customer projects is part of the presentation.

•

Dicalite Mineral Fillers. (Technical Bulletin E-41). Dicalite Department, Great Lakes Carbon Corp., 18 East 48th Street, New York 17, N. Y. 8½ x 11 in. 12 pp.

Dicalite mineral fillers, based on diatomaceous silica, are described in this bulletin. Sections are devoted to chemical properties, density and bulking effects, particle structure, surface area, porosity and absorptiveness, heat conductivity and heat resistance, and other characteristics. A table details technical data on ten of the products. The last part of the booklet discusses applitations, which include use in sponge rubber products, and in various rubber specialty items to condition the surface and prevent wearing slick, especially when wet.

B-L-E 25: A Superaging and Flex Resistant Antioxidant for Natural and Synthetic Rubber. By F. B. Smith. (Research Report No. 19-A). Naugatuck Chemical Division, United States Rubber Co., Naugatuck, Conn. 8½ x 11 in. 14 pp.

A commercial antioxidant, designated B-L-E 25, is the subject of this brochure. Included are sections on a description of its effects on rubber, recommended uses, quality evaluation, applications in tires, in molded goods and in emulsions, test methods and physical properties. Numerous recipes for use of the material in natural and various synthetic rubbers are given, as are extensive data on aged and unaged properties of the vulcanizates. The superaging and flex resistance qualities of these are stressed.

•

Insular Vinyl Polymers and Copolymers. Rubber Corporation of America, Hicksville, N. Y. 8½ x 11 in. 28 pp.

This technical publication introduces a new line of synthetic resins for industry. Opening with a general introduction, the booklet continues with four sections, the first and second of which include technical specification sheets and application recommendations. The third gives recipes for compounds using insular polymers, and the last presents a description of test methods used for resin evaluation. The two-color design is unusually attractive.

•

Study of the Effects of High Aromatic Fuels on Elastomers. Thiokol Chemical Corp., 780 North Clinton Ave., Trenton, N. J. 8½ x 11 in. 12 pp.

This bulletin offers the results of tests of seven elastomers made to see how they react to various high-aromatic fuels. Base formulations are given, methods of test are described, and results of the tests on physicals (volume swell, tensile strength, elongation, modulus, Shore A hardness and low temperature stiffness) are given. Graphs and tables are used to present the data. Conclusions drawn from the study are analyzed in the text.

•

Dabco. (Data Bulletin No. 3). Houdry Process Corp., 1528 Walnut St., Philadelphia 2, Penna. 8½ x 11 in. 20 pp.

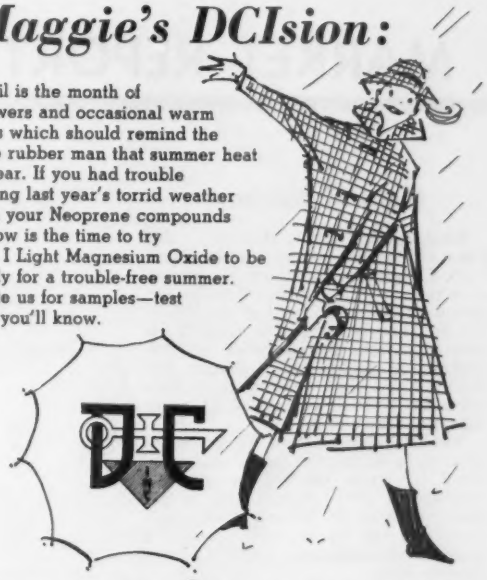
This technical data bulletin offers information on Dabco (tradename for triethylenediamine), a one-shot polyether catalyst for producing urethane foams. The publication describes flexible machine-made, flexible hand-mixed and rigid one-shot polyethers which incorporate the product, pointing out foam formulation, foam preparation and machine conditions, foam characteristics and physical properties. Polyether prepolymers and dimer acid ester foams are also covered.

•

Sprout-Waldron Slider-Board Belt Conveyor. (Bulletin No. 175-B). Sprout, Waldron & Co., Inc., Muncy, Penna. 8½ x 11 in. 4 pp.

This revised bulletin on slider-board belt conveyors provides information on construction, installation and operational methods. In addition to text which gives general information and explains design features, close-up photographs show the drive mechanism and its ease of accessibility for inspection and cleaning. Also included is an engineering drawing with complete specifications and capacity ratings.

Maggie's DCIsion:



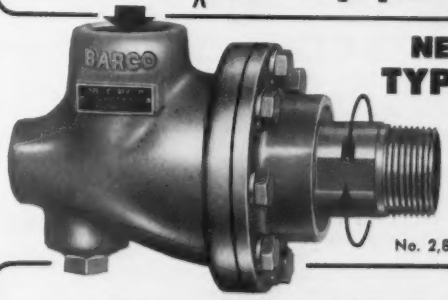
April is the month of showers and occasional warm days which should remind the wise rubber man that summer heat is near. If you had trouble during last year's torrid weather with your Neoprene compounds —now is the time to try D C I Light Magnesium Oxide to be ready for a trouble-free summer. Write us for samples—test and you'll know.

DARLINGTON CHEMICALS, INC.

1420 Walnut St., Philadelphia 2, Pa.

Represented by Summit Chemical Co., Akron
Tumpeer Chemical Co., Chicago
The B. E. Dougherty Co., Los Angeles and San Francisco

Better
Need a rotary joint?



NEW TYPE C

Patent No. 2,836,439

-it's BARCO!

For countless applications, Barco's new Type C Rotary Joint will give you the best operating records you've ever had—*and for LESS COST!*

"CRACK-FREE" CHROME PLATED SLEEVE—A standard Barco feature. Minimizes corrosion, friction, wear. Stainless steel spring also standard.

RESISTS SEAL RING BREAKAGE—The spherical seal ring is under compression, not *tension*, loading. Self-adjusting for wear. Seal withstands shock loads and alternating hot and cold service.

WIDE SPACED BEARINGS—Two, instead of one . . . increased bearing area. No lubrication required. Lowest friction.

200 P. S. I. STEAM RATING—Heavy duty service at *no extra cost.* Eight sizes, ½" to 3". *Send for new Catalog 310 today.* **BARCO MANUFACTURING CO., 550E Hough Street, Barrington, Illinois.**

MARKET REPORTS

TRENDS
NEWS
PRICES

Natural Rubber

Since our last report (March 2), the price of natural rubber on the New York Commodity Exchange has moved in a range of 200 points, high for the period being 32.75c reached on March 30, and low being 30.75c reached on March 2. The average price of spot rubber for the month of March was 31.62c based on 21 trading days. This compares with an average of 30.26c in the preceding month.

Rubber prices in New York rose to new highs during the period and were close to levels reached in the late summer of 1957. Market activity has been centered in futures. Encouragement for the buying enthusiasm was derived from optimistic reports on automobile sales.

Quality Conference

The Rubber Manufacturers Association reports that the Singapore Chamber of Commerce Rubber Association has indicated its willingness to postpone until 1960 a third international conference on rubber quality problems.

The Singapore organization had proposed last October that natural rubber producing and consuming interests get together early in 1959 to come to agreement on certain problems that have arisen since the new International Types were adopted in place of the RMA Types two years ago.

Both the RMA Crude Rubber Committee, author of the new standards, and the Rubber Trade Association of New York took the position that such a conference should be delayed at least until the next meeting of the International Rubber Study Group. That meeting is now tentatively scheduled for Kuala Lumpur in the spring of 1960.

Background of Standards

The new international quality standards grew out of the work of the RMA Crude Rubber Committee, which first promulgated the RMA Types in 1928. The RMA Types, covering 30 grades, stood as internationally recognized standards until February, 1957, when, following quality conferences in Singapore and New York, world producing and consuming organizations adopted the now prevailing International Types.

These covered 24 of the original RMA Types. The new standards also take cognizance of the six disputed RMA grades and the six overlapping Singapore grades which U.S. consumers have held to be slightly inferior to the corresponding RMA grades. A major objective of the next conference would be to compromise the differences on the disputed grades and resolve trading to 30 basic agreed international grades.

Both U.S. groups took the position that a 1959 conference would be premature inasmuch as insufficient time had elapsed since adoption of the Singapore types to obtain a proper evaluation.

NEW YORK, APRIL 1, 1959

Price Data

Closing Rubber Prices on New York Commodity Exchange

FROM MARCH 1 TO MARCH 31

Mar.	Spot	May	July	Sept.	Sales
1	....	....	....	....	...
2	30.75	31.07	31.05	31.05	164
3	30.88	31.20	31.20	31.15	84
4	30.88	31.20	31.25	31.25	62
5	30.88	31.05	31.15	31.12	56
6	31.25	31.35	31.40	31.40	34
7	....	....	....	....	...
8	....	....	....	....	...
9	31.75	31.80	31.85	31.82	79
10	31.50	31.45	31.50	31.50	68
11	31.25	31.40	31.40	31.38	58
12	31.25	31.30	31.35	31.40	52
13	31.13	31.10	31.15	31.20	31
14	....	....	....	....	...
15	....	....	....	....	...
16	31.50	31.55	31.55	31.60	36
17	31.50	31.50	31.58	31.50	22
18	31.75	31.90	31.90	32.00	66
19	31.63	31.65	31.70	31.80	13
20	31.88	31.85	31.85	31.85	34
21	....	....	....	....	...
22	....	....	....	....	...
23	32.13	32.10	32.16	32.15	81
24	32.25	32.35	32.30	32.25	76
25	32.25	32.20	32.15	32.10	73
26	32.25	32.50	32.35	32.35	92
27	....	....	....	....	...
28	....	....	....	....	...
29	....	....	....	....	...
30	32.75	32.95	32.84	32.75	87
31	32.63	32.80	32.60	32.60	63

Outside Market

No. 1 Ribbed Smoked Sheets:	
Spot	.32⅝
May	.32⅝
June	.32⅝
Thin Latex Crepe:	
Spot	.34
Thin Brown Crepe, No. 2	.31½
Flat Bark Crepe	.28¼

London Market
(Standard Smoked Sheets)

May	31.83 — 31.98
July-Sept.	31.98 — 32.12

Singapore Market
(Standard Smoked Sheets)

May	30.53 — 30.65

Middling Upland Quotations

	Feb. 27	March 31		
	Close	High	Low	Close
May	35.58	35.89	35.80	35.81
July	34.72	35.15	35.07	35.11
Oct.	32.19	32.81	32.74	32.79

Notes & Quotes

Continuing optimism for the rubber industry was voiced recently by J. W. Keener, president of the B. F. Goodrich Co. Mr. Keener said that consumption of new rubber in the United States this year is expected to reach 1.55 million long tons representing an increase of about 200,000 long tons over 1958. Mr. Keener believes that the rubber industry may "run a little ahead" of the rest of the nation's economy in 1959.

Synthetic Rubber

The duplication of natural rubber in a test tube occurred some years ago, analysts at Merrill Lynch, Pierce, Fenner & Smith point out. However, manufacture of the product has until the present time been limited to pilot plant production.

The development of "natural-synthetic" was not considered as a serious threat to natural because the price of the new material was substantially above that for the natural product.

Now that U.S. Rubber and Shell Chemical have announced the development of a natural-synthetic to sell at 30c a pound, the implications for natural rubber are believed to be more serious.

Even Lower Prices Ahead?

John W. McGovern, president of U.S. Rubber, states that conceivably the new rubber could sell at even lower prices in coming years as mass production techniques are improved.

Present production is at the rate of five tons per day. As additions to plant are made during the year, effective capacity is scheduled to increase to a rate of 15-20,000 tons annually perhaps by year-end.

Several other companies have developed natural-synthetic rubbers. Shell states, however, that "up to now" it has the lowest priced product and is substantially ahead in time. Firestone's plant for Coral rubber is nearing completion. With a total capacity of 30,000 tons annually, this plant is scheduled to be in production late next year.

At the moment, U.S. Rubber is using the new synthetic for truck tires in the popular 7.50-20 size. As the supply increases, it will expand to truck tires in other sizes. The new synthetic should find several other markets, one of which is the shoe industry, particularly in crepe soles where light color is desired.

Competitive Price Problem

Some in the industry are of the opinion that Shell may not be able to keep the price of the new rubber competitive with natural after it expands production. The base price for polyisoprene, for example, is said to be considerably higher than that for polybutadiene. This latter material is also in the natural-synthetic category and several companies including Phillips Petroleum and Montecatini of Italy are working with this material.

Firestone's new plant at Orange, Texas, is capable of producing either polyisoprene or polybutadiene. Esso, on the other hand, is expected to market an all-butyl tire. The determining factor, in all cases, will be the matter of price. Some are of the opinion that treads of passenger car tires will continue to be butadiene-styrene rubber, with the rest of the tire made of either natural-synthetics or natural.

ABSOLUTELY
TOPS
IN
NON-STAINING!

ANTIOXIDANT 425®

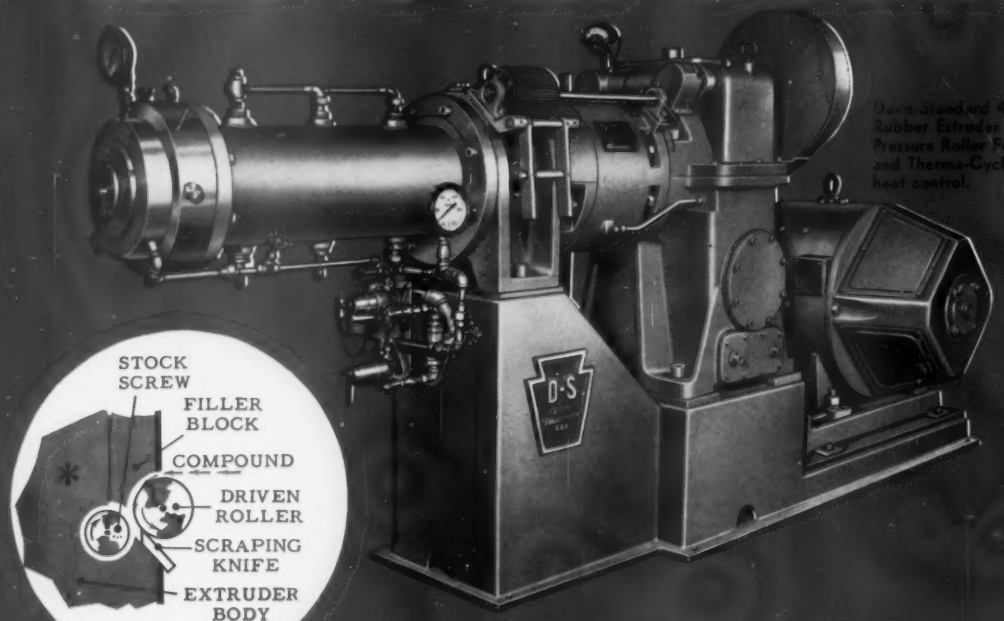
Where absolute whiteness—and *lasting whiteness* with *exceptional antioxidant activity*—is the goal, Antioxidant 425 is the automatic choice. The reason is simply its unequaled performance, proven over and over, in quality rubber products.

Full information, and samples, from

CYANAMID

AMERICAN CYANAMID COMPANY
Rubber Chemicals Department • Bound Brook, New Jersey

DESIGNED FOR HARD-TO-FEED STOCKS!



D-S PRESSURE ROLLER FEEDER RUBBER EXTRUDERS

FASTER, MORE EFFICIENT EXTRUSION OF TACKY, LOW-TENSILE STOCKS SUCH AS SILICONES AND BUTYLS.

Davis-Standard Rubber Extruders with Pressure Roller Feeders for low-tensile stocks and Automatic Roller Feeders for harder compounds hold consistent delivery tolerances within 1% on stocks which formerly were difficult to feed — even by hand. Ball regurgitation, which often causes starvation of the screw, is prevented.

A self-contained heater-cooler for the cylinder of D-S Rubber Extruders is available to maintain optimum extrusion temperature.

✻ Both the *Automatic* and *Pressure* Roller Feeders employ a highly-polished chrome-plated roller. A filler block is added to the feed throat, and a scraping knife is positioned against the roller to prevent film build-up.

The Pressure Roller Feeder is driven through a torque-limiting clutch which allows the roller to slow down or stop when the feed section is fully charged with compound.

DAVIS-STANDARD PRESSURE ROLLER FEEDER RUBBER EXTRUDERS ARE AVAILABLE IN ALL BORE SIZES FROM 2" to 8".

The complete line of D-S quality wire machinery includes:

Rubber Extruders	Self-Braking Pay-Offs	Drag Capstans
Splice Boxes	Vulcanizing Tubes	Steam and Water Seals
Continuous Take-Ups	Pulling Capstans	Caterpillar Capstans
Dancer Control Columns		Wire Measuring Machines

For further information write to:

D-S MYSTIC CONNECTICUT U.S.A.

DAVIS-STANDARD

DIVISION OF FRANKLIN RESEARCH CORPORATION

14 WATER STREET, MYSTIC, CONNECTICUT

***Patent Pending*

IN EUROPE AND THE STERLING AREA. CONTACT FINNEY PRESSES LTD., BIRMINGHAM, ENGLAND

U. S. Shor-Kwik inflatable dunnage by U. S. Rubber Co. uses Wellington Sears nylon fabric.

Fabric helps protect cargo with cushions of air

Unoccupied box-car space can cause costly damage to goods in transit. This space must be controlled by "dunnage," usually consisting of elaborate blocking, bracing and strapping, to keep cargo from shifting or breaking loose.

These days, rigid bracing is being replaced more and more by new *inflatable* dunnage. Bags made of a neoprene-coated nylon fabric, enclosing a butyl rubber air chamber, are placed in position and inflated. They hold cargo firmly yet resiliently. This method is fast and cheap. Inflatable dunnage reduces cargo handling costs, cuts down damage claims considerably. It deflates easily for return shipment.

Once again, as in so many of the recent new developments in rubber and plastics, Wellington Sears provides the fabric. It is another important example of how this company continues to add to its record of textile service to industry for more than a century. This experience is yours to call on for help in solving your fabric problems. For free copy of "Fabrics Plus," write Department G-4.

WELLINGTON SEARS

FIRST In Fabrics For Industry

For Mechanical Goods, Coated Materials, Tires, Footwear and Other Rubber Products

WELLINGTON SEARS COMPANY, 111 WEST 40TH STREET, NEW YORK 18, N. Y.

Atlanta • Boston • Chicago • Dallas • Detroit • Los Angeles • Philadelphia • San Francisco • St. Louis

PRICES OF COMMERCIALLY AVAILABLE SYNTHETIC RUBBER

Dry Rubber

(per pound carload)

Butadiene-Acrylonitrile Types

Butaprene NF	.4900
Butaprene NH	.6500
Butaprene NL	.5000
Butaprene NXM	.5800
Chemigum N1NS	.6400
Chemigum N3NS	.5800
Chemigum N5	.5800
Chemigum N6	.5000
Chemigum N6B	.5000
Chemigum N7	.5000
Chemigum N8	.5000
Chemigum N600	.5000
Herecol N-33	.6800
Hycar 1001	.5800
Hycar 1002	.5000
Hycar 1014	.6000
Hycar 1041	.5800
Hycar 1042 and 1043	.5000
Hycar 1051	.5800
Hycar 1052	.5000
Hycar 1053	.5000
Hycar 1072	.6400
Hycar 1203	.4600
Hycar 1312	.5000
Hycar 1411	.6200
Hycar 1432	.5900
Hycar 1441	.6200
Paracril AJ	.4850
Paracril ALT	.5000
Paracril B and BJ	.5000
Paracril BLT and BJLT	.5000
Paracril C and CLT	.5800
Paracril CV	.5900
Paracril D	.6500
Paracril 18-80	.6000
Paracril OZO	.4600
Polysar Krynac 800	.5000
Polysar Krynac 801	.5800
Polysar Krynac 802	.5000
Polysar Krynac 803	.5000

Butadiene-Styrene Types

Ameripol 1000	.2410
Ameripol 1001	.2410
Ameripol 1002	.2435
Ameripol 1006	.2410
Ameripol 1006 (crumb)	.2475
Ameripol 1007	.2410
Ameripol 1009	.2475
Ameripol 1009 (crumb)	.2590
Ameripol 1011	.2475
Ameripol 1012	.2425
Ameripol 1012 (crumb)	.2490
Ameripol 1013	.2500
Ameripol 1013 (crumb)	.2615
Ameripol 1500	.2410
Ameripol 1501	.2410
Ameripol 1502	.2410
Ameripol 1703	.2060
Ameripol 1705	.2035
Ameripol 1707	.1910
Ameripol 1708	.1910
Ameripol 1710	.1885
Ameripol 1712	.1885
Ameripol 4600	.2410
Ameripol 4650	.1820
Ameripol 4651	.1770
Ameripol 4652	.1425
Ameripol 4654	.1870
Ameripol 4655	.1820
Ameripol 4700	.1750
Ameripol 4701	.1725
Ameripol 4750	.1545
Ameripol 4751	.1400
Ameripol 4752	.1600
Ameripol 4753	.1480
ASRC 1000	.2410
ASRC 1001	.2401
ASRC 1004	.2401
ASRC 1006	.2410
ASRC 1009	.2475
ASRC 1018	.2700
ASRC 1019	.2650
ASRC 1500	.2410
ASRC 1502	.2410
ASRC 1503	.2625
ASRC 1703	.2060
ASRC 1708	.1910
ASCR 3110	.2600
Baytown 1600	.1930
Baytown 1601	.1930
Baytown 1602	.1930
Baytown 1801	.1760
Baytown 1803	.1740
C-102 (Shell)	.2300
Carbomix 3750	.1820
Carbomix 3751	.1545
Carbomix 3752	.1845
Carbomix 3753	.1640
Carbomix 3754	.1770
Carbomix 3755	.1470
CB-102 (Shell)	.1850
Copo 1500	.2410
Copo 1502	.2410
Copo 1505	.2610
Copo 1712	.1885
Copo 1773	.2060
Copo 1778	.1910
Copo 2109	.3000
Copo 3900	.2310
FR-S 123	.1960
FR-S 127	.2600
FR-S 141	.2800
FR-S 146	.2410
FR-S 154	.1885
FR-S 155	.1885
FR-S 158	.3000
FR-S 173	.2060
FR-S 178	.1910
FR-S 179	.2410
FR-S 181	.2410
FR-S 1000	.2410
FR-S 1001	.2410
FR-S 1004	.2410
FR-S 1006	.2410
FR-S 1007	.2410
FR-S 1009	.2475
FR-S 1010	.2600
FR-S 1012	.2425
FR-S 1013	.2500
FR-S 1014	.2810
FR-S 1500	.2410
FR-S 1502	.2410
FR-S 1703	.2060
FR-S 1710	.1885
FR-S 1712	.1885
Naugapol 1016	.2650
Naugapol 1018	.2700
Naugapol 1019	.2650
Naugapol 1021	.3000
Naugapol 1022	.2800
Naugapol 1023	.2850
Naugapol 1503	.2625
Naugapol 1504	.2950
OB-102 (Shell)	.1825
OB-104 (Shell)	.1475
OB-106 (Shell)	.1510
OB-110 (Shell)	.1410
OB-111 (Shell)	.1540
OB-113 (Shell)	.1750
Philprene 1000	.2410
Philprene 1001	.2410
Philprene 1006	.2410
Philprene 1009	.2475
Philprene 1010	.2600
Philprene 1018	.2700
Philprene 1019	.2650
Philprene 1100	.1940
Philprene 1104	.1900
Philprene 1500	.2410
Philprene 1502	.2410
Philprene 1503	.2625
Philprene 1600	.1930
Philprene 1601	.1930
Philprene 1605	.1900
Philprene 1703	.2060
Philprene 1706	.2030
Philprene 1708	.1910
Philprene 1712	.1885
Philprene 1803	.1740
Plioflex 1006	.2410
Plioflex 1500C	.2410
Plioflex 1502	.2410
Plioflex 1507	.2410
Plioflex 1703	.2060
Plioflex 1710C	.1885
Plioflex 1712C	.1885
Plioflex 1713	.1750
Plioflex 1714C	.1725
Plioflex 1773	.2060
Plioflex 1778	.1910
Polysar Kryflex 200	.2510
Polysar Krylene	.2410
Polysar Krylene NS	.2410
Polysar Krynol 651	.1885
Polysar Krynol 652	.1910
Polysar S	.2410
Polysar S-50	.2410
Polysar S-X 371	.2550
Polysar SS-250	.2875
S-1000	.2300
S-1002	.2325
S-1006	.2300
S-1009	.2400
S-1011	.2325
S-1013	.2300
S-1100	.1850
S-1500	.2300
S-1502	.2300
S-1600	.1825
S-1602	.1825
S-1605	.1800
S-1703	.1950
S-1707	.1800
S-1709	.1775
S-1712	.1775
S-1803	.1650
S-1804	.1750
S-7701	.1850
SP-103 (Shell)	.2900
Synpol 1000	.2410
Synpol 1001	.2410
Synpol 1002	.2435
Synpol 1006	.2410
Synpol 1007	.2410
Synpol 1009	.2475
Synpol 1012	.2425
Synpol 1061	.2410
Synpol 1500	.2410
Synpol 1502	.2410
Synpol 1551	.2410
Synpol 1703	.2060
Synpol 1707	.1910
Synpol 1708	.1910
Synpol 1711	.1900
Synpol 1712	.1885
Synpol 8000	.2410
Synpol 8150	.1930
Synpol 8200	.1910
Synnol 8201	.1750
Synpol 8250	.1740
Synpol 8253	.1584
Synpol 8254	.1545
Synpol X 274	.2550

Butyl Rubbers

Enjay Butyl 035 and 150	.2300
Enjay Butyl 165 NS	.2400
Enjay Butyl 215	.2300
Enjay Butyl 217	.2300
Enjay Butyl 218	.2300
Enjay Butyl 268 NS	.2400
Enjay Butyl 325	.2300
Enjay Butyl 365 NS	.2400
Polysar Butyl 100	.2450
Polysar Butyl 101	.2775
Polysar Butyl 200 and 300	.2450
Polycar Butyl 301	.2550
Polysar Butyl 400	.2450

Chlorosulfonated Polyethylene

Hypalon 20	.7000
Hypalon 30	.7000

Neoprene

	(prices l.c.l.)
Neoprene Types AC and CG	.5500
Neoprene Type AD	.5500
Neoprene Type FB	.6500
Neoprene Type GN	.4100
Neoprene Type GN-A	.4100
Neoprene Type GRT	.4200
Neoprene Type KNR	.7500
Neoprene Type S	.4200
Neoprene Type W	.3900
Neoprene Type WB	.4100
Neoprene Type WHV	.3900
Neoprene Type WRT	.4500
Neoprene Type WX	.4100

Polysulfide Rubbers

	(prices l.c.l.)
Thiokol Type A	.5000
Thiokol Type FA	.6900
Thiokol Type ST	1.2500

Silicone Rubbers*

	(prices l.c.l.)
GE (compounded)	2.50
GE Silicone Gum (not compounded)	4.00
Silastic (compounded)	1.90
Silastic (gums)	3.85
Union Carbide (gums)	4.00
Union Carbide (compounds)	2.50

POLYMERS

Latex

(per pound carload)

Butadiene-Styrene Types

Butaprene N-300	.4600	2
Butaprene N-400	.5400	1
Butaprene N-401	.5400	1
Chemigum 200	.4900	2
Chemigum 235	.5400	2
Chemigum 236	.5400	2
Chemigum 245	.4600	2
Chemigum 246	.4600	2
Chemigum 247	.4600	2
Chemigum 248	.4600	2
CL-101 (Shell)	.2800	2
Hycar 1512	.4600	2
Hycar 1551	.5400	2
Hycar 1552	.4600	2
Hycar 1561	.5400	2
Hycar 1562	.4600	2
Hycar 1571	.5400	2
Hycar 1572	.5100	2
Hycar 1577	.4600	2
Hycar 1852	.4600	2
Nitrex 2612	.4600	1
Nitrex 2614	.4600	1
Nitrex 2614-A	.4600	1
Nitrex 2515	.5100	1
Nitrex 2615-A	.5100	1
Nitrex 2616	.5400	1
Nitrex 2617	.4600	1
Nitrex 2617-A	.4600	1
Nitrex 2619	.5300	1
Nitrex 2620	.4600	1
Nitrex 2625	.4600	1
Copo 2101	.3000	2
Copo 2102	.3200	2
Copo 2105	.3200	2
Copo 2108	.3375	2
Copo 2110	.3200	2
Copo X-800	.2775	2
FR-S 2000	.2775	2
FR-S 2001	.2775	2
FR-S 2002	.3000	2
FR-S 2003	.3050	2
FR-S 2004	.3050	2
FR-S 2006	.2900	2
FR-S 2105	.3200	2
Naugatex 2000	.2775	1
Naugatex 2001	.2775	1
Naugatex 2002	.3000	1
Naugatex 2006	.2900	1
Naugatex 2105	.3200	1
Naugatex 2107	.3200	1
Naugatex 2108	.3000	1
Pliolite 2000	.2775	2
Pliolite 2001	.2775	2
Pliolite 2076	.2900	2
Pliolite 2104	.3200	2
Pliolite 2105	.3200	2
Pliolite 2107	.3200	2
Pliolite 2108	.3000	2
S-2000	.2600	2
S-2006	.2600	2
S-2101	.2600	2
S-2105	.2800	2
S-2108	.2900	2

Neoprene

Neoprene Latex 60	.4000	2
Neoprene Latex 571	.3700	2
Neoprene Latex 572	.3900	2
Neoprene Latex 601-A	.4000	2
Neoprene Latex 673	.5000	2
Neoprene Latex 735	.3800	2
Neoprene Latex 736	.3800	2
Neoprene Latex 842-A	.3700	2
Neoprene Latex 950	.4700	2

Polysulfide Rubbers

Thiokol Type MX	.8000	2
Thiokol Type WD-2	1.2500	2
Thiokol Type WD-6	.8000	2

Notes: (1) Freight allowed. (2) Freight extra. (3) Freight prepaid. *Covers a wide range of compounds. Readers are urged to check specific prices with producers.

DANGERS of launching a NEW PRODUCT

Snell Research can help overcome them

Here's how, in some typical case histories of Snell clients:

Product Research and Development—A few years ago Snell was retained to develop new products, applications, and markets for sugar. Extensive research and development work by Snell resulted in the creation of a new synthetic detergent—based on *sugar!*

Product Application—A Snell client in the paper industry, for whom we had developed a fine additive, wanted to explore uses in other fields. Unfortunately, their highly qualified staff's experience was limited to the one field. Snell, with experts in practically every product field, found the new product has potentialities as both a good emulsifier and a paint plasticizer. Only the very largest manufacturing companies can duplicate the breadth of experience and background the Snell "brain-trust" of technical experts can offer you!

Product Improvement—One Snell client found their product, an adhesive bandage, slipping in quality. Tape was going gooey in storage on druggists' shelves. Snell research helped this client bring his product quality up to equal the best on the market, and retain his share of sales.

Product Evaluation—A Snell brewery client wanted to expand production and take advantage of a more efficient production technique but feared the taste of the beer might suffer. Snell food technologists, taste panels, and engineers checked the new process and hundreds of samples of beer made under new and old systems, recommended the switch to the more profitable modern process. The change went unnoticed by the customers, and sales continued to climb.

Market Research—A Snell client with a waste product had briefly considered building a plant to use it to manufacture another product; but had given up after their own brief survey showed the new product to be already overproduced. When they consulted Snell for checking, however, Snell predicted there would be a shortage within three years. The client waited two years, built the plant—and now has a profitable new product instead of a waste!

Toxicology—One of the largest frozen food companies began getting complaints on the flavor of one of their green vegetables. Since hundreds of thousands of dollars were at stake, they consulted Snell to find out what was wrong. Snell by analyzing tests, and checking on the farm, was able to prove that the taste—actually toxic—was due to a new type of insecticide sprayed on the fields hundreds of yards away on a windy day long before the harvest!

Engineering—A large midwestern firm desired to produce its own brand of instant coffee, to possess outstanding flavor, body, and bouquet. They engaged Snell to handle all details, from design to engineering, to supervision of actual process startup. The fine qualities "built into" this resultant product made it such a success that Snell was commissioned to enlarge the plant, which has recently gone into production.

What's Your Product Problem?—Whatever it is, and whatever your product field—chemicals, chemical specialties, personal products, pulp and paper, protective coatings, plastics, textiles, foods, petroleum, rubber—Snell has men who "know the score" in that field, and who can work with you creatively and profitably in developing, producing, protecting, and marketing new ideas. This broad experience can be decisive in protecting not only your ideas, but also the thousands of dollars you spend developing them. And the cost of Snell service is less than you might imagine! Half the jobs we do cost less than $1000!

SEND FOR FREE BOOKLET

On Research Development & Testing "SERVICES FOR YOU." It tells you how Snell can serve YOU! No obligation, of course. Foster D. Snell, Inc., Dept. R-4, 29 W. 15th Street, N. Y. 11, N. Y.

FDS **SNELL**

New York, N. Y.
Baltimore, Md.
Bainbridge, N. Y.
Worcester, Mass.

MARKETS

(continued)

Reclaimed Rubber

Final figures for 1958 have now been released for the reclaimed rubber industry by the Department of Commerce. The Department's figures show that in 1958, 259,578 long tons of reclaimed rubber were produced in the U.S. A total of 147 long tons were imported for a total net new supply of 259,725 long tons. In 1957, total net new supply of reclaim was 274,147 long tons.

Consumption of reclaim in 1958 has been set at 246,656 long tons, against the 266,852 long tons consumed in the previous year. In 1958, the domestic industry exported 10,521 long tons of reclaimed rubber, while in 1957, 12,178 long tons were exported.

As of December 31, 1958, there were 28,563 long tons of reclaimed rubber in stocks, contrasted with the 29,323 long tons in stocks as of December 31, 1957.

By all accounts, 1959 was not nearly as bad a year as many had expected. Current indications, particularly accelerated automobile production, point to increased consumption in 1959, perhaps approaching 300,000 long tons.

(Prices for All Areas Except Calif.)

	per lb.
Premium Grade Whole Tire	.11½
First Line Whole Tire	.11
Second Line Whole Tire	.10½
Third Line Whole Tire	.10¼
Fourth Line Whole Tire	.09¾
Black Carcass	.15¼
No. 1 Light Colored Carcass	.22
No. 1 Peel	.11
Butyl Tube Reclaim	.14
Natural Rubber Black Tube	.16
Natural Rubber Red Tube	.21
Natural Rubber Gray Tube	.21

Scrap Rubber

The scrap rubber market, at least at the moment, is displaying a softer undertone with consumers buying on a limited basis. Slackening consumer demand was felt mainly in the tube section of the market, with prices easing somewhat.

Now that Chrysler Corp. has resumed full production after a strike by one of its suppliers, business should pick up all along the line with greater demands for reclaim prompting greater demands for scrap rubber.

In total, the trade expects that the scrap rubber business will experience a fairly good year in 1959. It is felt that inventories have been decreased to some extent in past weeks and that business will pick up accordingly now.

(Prices Delivered Akron)

Mixed tires	ton	14.00
Light colored carcass	lb.	.04¼
No. 1 peelings	ton	30.00
No. 2 peelings	ton	25.00
No. 3 peelings	ton	21.00
Buffings	ton	16.00
Truck and Bus S.A.G.	ton	20.00
Passenger S.A.G.	ton	20.00
Natural Rubber Red Tubes	lb.	.07¼
Natural Rubber Black Tubes	lb.	.06½
Butyl Rubber Tubes	lb.	.05¼

Tire Fabrics

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., announced recently that the company has increased the prices of its high tenacity rayon tire year, effective with March orders. DuPont's new prices are the same as those quoted by Tyrex yarn producers. All domestic producers of certified Tyrex viscose tire yarn announced price increases of 2c to 3c a pound late last year.

American Enka Corp. announced that effective December 22, the price of its 1100 denier Tyrex yarn would be increased from 64c to 66c per pound. The 1650 denier yarn was raised from 58c to 60c. In addition, the company's 900 denier yarn was increased to 71c a pound and its 2200 denier yarn to 59c a pound.

Following this, comparable price increases for the 1100 and 1650 denier yarns were announced by the other domestic producers of Tyrex yarns, American Viscose Corp., Beaunit Mills, Inc., and Industrial Rayon Corp.

Reject Japanese Proposal

A report in the *Journal of Commerce* states that the United States textile industry has rejected Japan's proposal for a moderate increase in the total amount of Japanese cotton goods to be shipped into the American market this year. After meetings with broad woven fabrics and apparel manufacturers, Assistant Secretary of Commerce, Henry Kearns said the United States industry's reaction to the latest Japanese proposal is "generally unfavorable".

Mr. Kearns said that Japan had proposed a "very modest increase in total yardage" to be shipped to this country in 1959 along with a "slight reduction" in various subquotas of goods provided for within the over-all quota. The unfavorable reaction stemmed from United States producers' unwillingness to accept an increase in the over-all limit of 235 million square yards at which Japan "voluntarily" held its total cotton goods exports since 1957.

(Prices f.o.b. Shipping Point)

Rayon Tire Cord

1100	lb.	.73
1650	lb.	.67
2200	lb.	.67½

Nylon Tire Cord

210	lb.	1.96
840	lb.	1.70

Rayon Graded Fabric

1100	lb.	.69
1650	lb.	.63½
2200	lb.	.63

Cotton Chafers

8.9	oz. (per square yard)	lb.	.71
9.25	oz. (per square yard)	lb.	.69
11.65	oz. (per square yard)	lb.	.63
14.4	oz. (per square yard)	lb.	.72

Liquid Latex

Natural: The U.S. Department of Commerce reports that 66,130 long tons of natural rubber latex were imported into the United States in 1958, some 3,000 long tons more than in the previous year. A total of 70,933 long tons of natural latex were consumed in 1958, some 5,000 long tons less than in the preceding year. As of December 31, 1958, there were 8,900 long tons of natural latex in stocks compared with the 14,454 long tons in stocks on December 31, 1957.

Natural latex is currently selling at a 39-40c per pound level at East Coast ports in car load lots, a reflection of the increased price for dry natural. Historically, some small resistance has been experienced at the 40c level. At the moment, however, consumption of natural latex is proceeding at a pace in excess of average monthly consumption in 1957.

Synthetic: Total consumption of synthetic latex in 1958 has been put at 80,087 long tons by the U.S. Department of Commerce. This figure is about 8,000 long tons less than total consumption in 1957. A total of 86,131 long tons of synthetic latex were produced in the United States in 1958. This was about 10,000 long tons less than produced in the previous year.

As of December 31, 1958, there were 11,754 long tons of all types of synthetic latex in stocks, while as of December 31, 1957, there were 12,088 long tons in stocks.

It is anticipated in most quarters that total consumption of synthetic latex in 1959 will approach if not pass the 1957 totals. It may be that 1959 will see the consumption of 100,000 long tons of synthetic latex. If so, this will be a new record.

Cotton

The price of middling uplands cotton on the New York Cotton Exchange has moved in the range of 30 points since our last report (March 2), high for the period being 35.90c, reached on March 31, and low being 35.60c, on March 5 and 6. The average price of middling uplands for the month of March was 35.71c based on 21 trading days. This compares with an average of 35.69c in the previous month.

Rep. Harlan Hagen (D., Cal.) has urged an increase of $1,285,000 in cotton research funds for the fiscal year 1960, starting on July 1. Making his request to the House Appropriations Committee's Agriculture Subcommittee, Rep. Hagen said the funds would be used by the Department of Agriculture as the initial increment in a three year program proposed by the cotton industry to improve the quality of cotton fiber as it goes to the mills.

Most of the research work would be carried on at a department pilot spinning laboratory at Clemson, S. C. The expenditure of $767,000 in fiscal 1961 and $447,000 in 1962 is expected to be made to complete the program.

Call Hall

HALLCO NEWS

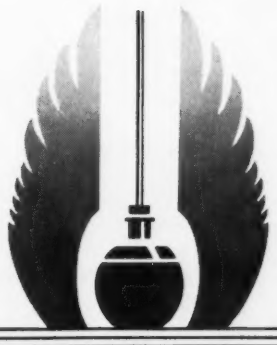
Issued by
The C. P. Hall Co.
Chemical Manufacturers

NEW PROTECTION FOR RUBBER AGAINST OZONE

Detero®* Wax Beads are a pleasure to work with . . . pour, measure and disperse easily . . . no more slabs to run your labor cost up or messy flakes. Detero Wax Beads are tried and tested. Used in rubber formulations they have definitely given superior protection against weather and ozone. They will not stick in hot weather or hot mill rooms, will speed processing and improve your product. Also available for vinyl plastics. Free-flowing Detero Wax Beads are the only such waxes available in this new, improved bead form . . . assure you of uniform mix every time. Manufactured by: Arrow Laboratories, Chicago. Distributed by the C. P. Hall Company.
*Process patent applied for

NEW COMET '600' MEETS ALL HIGH TEMPERATURE AGING REQUIREMENTS

The Comet "600" Laboratory Aging Block is designed for test-tube aging similar to ASTM Method D-865-52-T and aging in various fluids including oils and fuels at controlled temperatures from 100° to 600° F. Individual test tubes eliminate circulatory air contamination since each is insolated from the others. Built-in heating elements and temperature controls guarantee even heat and prevent hazardous noxious fumes. Precision machined of aluminum, it has a removable bottom plate for easy maintenance. All external parts are baked enamel or chrome plated.
Partlow Indicating and Proportioning-Type Thermostats insure exact temperature . . . all units are pre-calibrated at the factory. 15 inches high. 18 inches in diameter. Weighs 175 pounds. Also equipped with secondary temperature control, integral with block that prevents override of master control unit. Manufactured by: Product Packaging Engineering.
Sole distributors: The C. P. Hall Company.



HAVE YOU A PLASTICIZER PROBLEM?

The C. P. Hall Company has the most complete line of plasticizers in the industry from asphaltic to ester-type priced from 2c to 80c per pound. One of these may easily be the answer to your problem. Ask our technical sales representatives for complete information or "Call Hall" at the numbers listed below.

The C. P. Hall Co.
CHEMICAL MANUFACTURERS

AKRON	CHICAGO	MEMPHIS	LOS ANGELES	NEWARK
Phone	Phone	Phone	Phone	Phone
JEfferson	POrtsmouth	JAckson	MAdison	MArket
5-5175	7-4600	6-8253	2-2022	2-2652

MARKET PRICES

CHEMICALS & COMPOUNDING INGREDIENTS

APRIL 1, 1959

Prices are, in general, f.o.b. works and cover the domestic markets only. Export prices, as a rule, are usually slightly higher, due to packing regulations, special handling, etc.

Abbreviations: bbls., barrels; c.l., carload; cyl., cylinder; dlvd., delivered; dms., drums; eqld., equalized; l.c.l., less than carload; M.B. masterbatch; min., minimum; ref., refined; sap., saponified; sp., special; syn., synthetic; t.c., tank cars.

*Trademark. †For Export Only.

The arrangement of this section closely follows the Chemical Section of the 1957-58 RUBBER RED BOOK. Readers are referred to that edition for the correct classification of any material or brand name. Suppliers of every material are contacted for price information. However, only those materials are listed for which quotations have been furnished within the past six months. The quotations are not guaranteed and prospective purchasers should contact suppliers for information. Suppliers are requested to send current price information to the Market Editor, RUBBER AGE.

ACCELERATORS

A-1 (Thiocarbanilide)*	lb.	.74	.81
A-32*	lb.	.66	.80
A-100*	lb.	.52	.66
Accelerator No. 8*	lb.	—	1.25
Accelerator—49*	lb.	.59	.60
Accelerator 89*	lb.	—	1.20
Accelerator 108*	lb.	.92	.97
Accelerator—552*	lb.	—	2.25
Accelerator—808*	lb.	.66	.68
Accelerator—833*	lb.	1.17	1.19
Accelerator B*	lb.	—	.89
Altax*	lb.	.54	.56
Amax*	lb.	.80	.82
No. 1*	lb.	.76	.78
Ancap*(†)	lb.	.38	.40
Ancatax*(†)	lb.	.48	.50
Ancazate BU (ET & ME)*(†)	lb.	—	1.07
Ancazide ET*(†)	lb.	—	1.07
ME*(†)	lb.	—	1.14
Arazate*	lb.	—	2.25
Arquad 12*	lb.	.55	.61
Beutene*	lb.	.66	.71
Bismate, Rodform*	lb.	—	3.00
Butazate*	lb.	.87	.92
Butyl Eight*	lb.	1.10	1.35
Butyl Namate	lb.	.45	.50
Butyl, Ethyl & Methyl Zimate Slurry (50% solids content)	lb.	.85	.89
Captax*	lb.	.44	.46
C-P-B*	lb.	1.95	2.00
Cumate, Rodform*	lb.	—	1.45
Cydac*		.76	.78
DIBS*		—	.85
Diorthotolyguanidine	lb.	.69	.70
Dipac*	lb.	—	.85
Diphenylguanidine	lb.	.49	.50
El-Sixty*	lb.	.62	.69
Ethazate*	lb.	—	1.04
50D*	lb.	.87	.92
Ethyl Thiurad*	lb.	—	1.04
Ethyl Tuex*	lb.	—	1.04
Ethylac*	lb.	.93	.95
Guantal*	lb.	.62	.69
Harvex*	lb.	.70	.76
Hepteen Base*	lb.	1.85	1.90
Kure-Blend MT*	lb.	—	.70
Ledate, Rodform*	lb.	—	1.04
MBT-XXX*	lb.	.55	.57
MBTS Pellets*	lb.	.54½	.56½
Merac*	lb.	.75	1.05
Mercaptobenzothiazol	lb.	.44	.46
Mercaptobenzothiazyl Disulfide	lb.	.54	.56
Mertax*	lb.	.55	.62
Methazate*	lb.	—	1.04
Monex*	lb.	—	1.14
Mono Thiurad*	lb.	—	1.14
Morfex*	lb.	.65	.67
2-MT	lb.	.88	.90
NA-22* (for neoprene)	lb.	—	1.05
NOBS No. 1*	lb.	.76	.78
Special*	lb.	.80	.82
O-X-A-F	lb.	.55	.57
Pennac SDB*	lb.	.45	.48
Pentex*	lb.	—	1.24
Flour*	lb.	—	.30
Permalux (Neoprene)*	lb.	—	2.25
Phenex*	lb.	.60	.65
Polyac*	lb.	—	1.85
R-2 Crystals*	lb.	—	4.35
Rotax*	lb.	.55	.57
RZ-50-A*	lb.	—	1.00
B*	lb.	—	1.00
Santocure*	lb.	.76	.83
NS*	lb.	.80	.87
Selenac* (Ethyl, Methyl)	lb.	—	4.25
Seleram, Ethyl	lb.	—	3.00
Setsit-5*	lb.	.75	1.05
9*	lb.	.85	1.15
SPDX-GH*	lb.	.77	.79
GL*	lb.	1.20	1.30
Tellurac*	lb.	—	1.45
Tepidone*	lb.	.45	.48
Tetrone A*	lb.	—	1.98
Thiate A*	lb.	.88	—
B*	lb.	1.05	1.25
Thiofide*	lb.	.54	.61
S*	lb.	.64	.71
Thionex*	lb.	—	1.14
Thiotax*	lb.	.44	.51
Thiram, Ethyl	lb.	—	1.04
Methyl	lb.	—	1.14
Thiurad*	lb.	—	1.14
Thiuram E*	lb.	—	1.04
M*	lb.	—	1.14
Trimene*	lb.	.56	.62
Base*	lb.	1.03	1.10
Triphenyl Guanidine	lb.	—	.90
Tuads* (Ethyl)	lb.	—	1.04
Tuads* (Methyl)	lb.	—	1.14
Tuex*	lb.	—	1.14
Ultex*	lb.	1.15	1.20
Unads*	lb.	—	1.14
Vulcacure NB*	lb.	.45	.45
NS*	lb.	.75	1.05
TMD*	lb.	—	1.14
ZB*, ZE*, ZM*	lb.	.85	.89
Z-B-X*	lb.	2.45	2.50
Zenite*	lb.	.54	.56
Zenite A*	lb.	.69	.71
Zenite Special*	lb.	.55	.57
Zetax* (uncoated)	lb.	.55	.57
Zimate* (Butyl)	lb.	.85	.89
Zimate* (Ethyl)	lb.	.85	.89
Zimate* (Methyl)	lb.	.85	.89
Ziram, Butyl	lb.	—	1.04
50% Dispersion	lb.	.85	.89
Ziram, Ethyl	lb.	—	1.04
50% Dispersion	lb.	.85	.89
Ziram, Methyl	lb.	—	1.04
50% Dispersion	lb.	.85	.89

ACTIVATORS

Blue Lead Sublimed (dlvd.)	lb.	.17¼	.18¼
Cottonseed Fatty Acids			
Drew Wecoline C*	lb.	.17¾	.19
Wochem 210*	lb.	.16¾	.19¼
211*	lb.	.16¾	.19¼
Fish Oil, Hydrogenated, Fatty Acid			
DAR-S* (dlvd.)	lb.	.13	.15½
DAR-HY* (dlvd.)	lb.	.15¾	.18½
Hydrofol Acids* (dlvd.)	lb.	.15	.25¾
Hyfac 430* (dlvd.)	lb.	.18	.20½
Neo-Fat H.F.O.* (dlvd.)	lb.	.14½	.15¾
Neutrex* (dlvd.)	lb.	.15¾	.18½
Stearite*	lb.	.11¾	.14¾
Talene* (dlvd.)	lb.	.16¾	.19¼
Lime, Hydrated			
Arrowhead*	ton	—	21.00
Marblehead*	ton	—	19.25
Sierra*	ton	—	22.50
Litharge			
Eagle-Picher* (c.l.)	lb.	.18	—
SB* (dlvd.)	lb.	—	.18½
Magnesium Oxide, Heavy			
General Magnesite 500*	lb.	.05½	.06
600*	lb.	.06½	.07
Kaiser 325*	lb.	.057	.073
Michigan No. 15*	lb.	.05½	.06½

ACTIVATORS (Cont'd)

Magnesium Oxide, Light			
Carey Mag*	lb.	.25¼	.26
General Magnesite* (neoprene grade)	lb.	.26¾	.28¾
General Magnesite No. 101*	lb.	.23½	.24½
Genmeg MLW*	lb.	.23½	.24½
K & M* (neoprene grade)	lb.	.29¼	.30
Light Calcined Magnesia No. X-01*	lb.	.25¼	.26
Maglite D*	lb.	.23½	.26½
K*	lb.	.25¾	.27
L*	lb.	.29¾	.30¾
M*	lb.	.27	.28½
Marmag*	lb.	.24¾	.26
Michigan No. 30*	lb.	.25¼	.26
Neomag Powder*	lb.	.29¼	.30
Pellets*	lb.	.31¼	.32
Michigan No. 40*	lb.	.29¼	.30
Oleic Acid			
Dar-Chem* 105	lb.	.17¼	.19¾
Drew Wecoline OO*	lb.	.17¾	.19
Emersol 210* (dlvd.)	lb.	.17¼	.19¾
Groco Red Oil	lb.	.17¼	.19¾
Neo-Fat 92-04*	lb.	.20½	.22¼
94-04*	lb.	.18½	.20¼
Wochem 310, 311	lb.	.17	.19½
Palm Fatty Acids			
Groco 45*	lb.	.15¾	.18¼
Neo-Fat*	lb.	.15¾	.17¾
Wochem 280*	lb.	.15¾	.18¼
281*	lb.	.16¼	.18¾
Potassium Oleate (dms.)	lb.	.48	.73
Drew 24%*	lb.	.20	.73
Red Lead			
Eagle-Picher* (c.l.)	lb.	.19	—
No. 2 RM* (dlvd.)	lb.	—	.18½
Sodium Laurate, 75%*	lb.	.64	.89
Sodium Oleate, 75%*	lb.	.54	.79
Paste (dms.)	lb.	.39	.64
Sodium Stearate, 75%*	lb.	.47	.72
Stearic Acid, Single Pressed			
Emersol 110* (dlvd.)	lb.	.16¼	.18¾
Groco 53*	lb.	.16¼	.18¾
Neo-Fat 18-53*	lb.	.14¾	.16¾
Standard Pearlstearic* (dlvd.)	lb.	.16	.18½
Wochem 730*	lb.	.13	.15½
Stearic Acid, Double Pressed			
Choice Pearlstearic* (dlvd.)	lb.	.16	.18½
Emersol 120* (dlvd.)	lb.	.16¾	.19½
Groco 54*	lb.	.16¾	.19½
Hydrofol Acid 444	lb.	.12¼	.14¾
Neo-Fat 18-54*	lb.	.15¼	.17¾
Wecoline 200*	lb.	.14¾	.16
1000*, 1500*	lb.	.12	.13¼
Wochem 731*	lb.	.15¾	.18¼
Stearic Acid, Other			
Extra Pearlstearic* (dlvd.)	lb.	.17¾	.20¾
Groco*	lb.	.12¼	.14¾
Neo-Fat 18*	lb.	.18½	.20½
18-58*	lb.	.14¼	.16¾
18-61*	lb.	.16¼	.18¾
Stearex* (dlvd.)	lb.	.11¾	.13
Stearite*	lb.	.11¼	.13¾
Wecoline 300*	lb.	.15¼	.16½
Wochem 720*	lb.	.11¾	.14¼
721*	lb.	.11¾	.14¼
732*	lb.	.16¾	.19¼
White Lead Basic Carbonate	lb.	.19	.20
White Lead Basic Sulfate	lb.	.17¼	.18¼
Zinc Laurate			
Laurex*	lb.	.33	.34
Zinc Stearate	lb.	.41	.46
Aquazinc K.C.*	lb.	.30	.35
Crown Brand*	lb.	.39	.44

Unclassified Activators

Actifat* (dms.)	lb.	—	.18
Aktone*	lb.	.21¼	.23¼
Barak*	lb.	—	.65
Curade*	lb.	.57	.59
Dibenzo G-M-F	lb.	—	2.60
D-B-A*	lb.	—	1.95
G-M-F*	lb.	—	2.60
Dibutylamine (dlvd.)	lb.	.55½	.56½
MODX*	lb.	.38	.40
Neo Fat 42-07*	lb.	.10¾	.12¼
Ridacto* (dms.)	lb.	.25	.26
Snodotte* (dlvd.)	lb.	.20¼	.22¾
Vimbra	lb.	.32	.38½
Vulklor*	lb.	.88	.98

ANTI-COAGULANTS

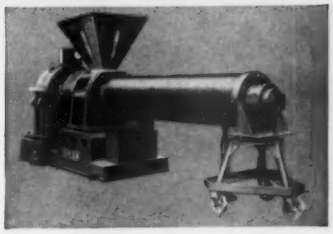
Aqua Ammonia* (dms.)	lb.	.031	.035
M.B.M.C.* (l.c.l.)	lb.	.54	.76

FRANCIS SHAW

quality engineering puts efficiency into Shaw machines

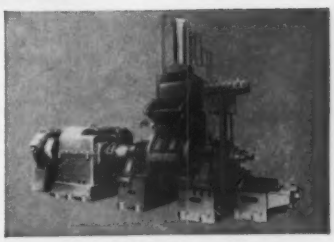
The cost-cutting performance of every Francis Shaw machine and its thorough dependability are the result of long experience and unvarying high standards of engineering in every detail of manufacture.

Close-limit accuracy and rigorous inspection during manufacture guarantee to the user a consistently high quality output from Francis Shaw equipment.



PLASTIC EXTRUDER. Fine temperature control is a vital feature of Francis Shaw extruders. All electric heating in separate zones is provided, each zone being separately controlled by proportioning instruments. A wide range of screw and die designs is available for the production of piping, sheeting, sections and the sheathing and insulation of cables.
Extruder sizes from 1" to 12".

CALENDER. A comprehensive range of Francis Shaw Calenders is available for the processing of all rubber and plastic materials. Flood Lubrication and hydraulic roll balancing available on all production sizes. Roll Bending can be fitted as an additional refinement. All sizes available from 13" x 6" to 92" x 32". Two-, Three- and Four-Bowl Designs.



INTERMIX. A robust, high efficiency Heavy Duty Internal Mixer for mixing plastic compounds at lower-than-normal temperatures. It is supplied with steam heating for plastics and other materials, and the exclusive rotor design ensures consistent high quality mixing.

FRANCIS SHAW

QUALITY ENGINEERING FOR QUANTITY PRODUCTION

Francis Shaw are available for the design, manufacture, and installation of a wide range of processing equipment

FRANCIS SHAW & COMPANY LIMITED MANCHESTER 11 ENGLAND

TELEPHONE EAST 1415-8 TELEGRAMS CALENDER MANCHESTER TELEX 66-357

LONDON OFFICE 22 GREAT SMITH STREET SW1 *PHONE ABBEY 3245* *GRAMS VIBRATE LONDON TELEX 2-2250*

FRANCIS SHAW (CANADA) LTD GRAHAMS LANE BURLINGTON ONTARIO CANADA

TELEPHONE NELSON 4-2350 *TELEGRAMS CALENDER BURLINGTON ONTARIO*

P.1160

ANTI-FOAMING AGENTS

Aero Anti Foam H*	lb.	——	.20
Regular*	lb.	——	.12
Anhydrol 6991*	lb.	.51	.56
D.C. Antifoam A*	lb.	5.45	6.65
Antifoam A Emulsion*	lb.	2.05	2.85
Antifoam AF Emulsion*	lb.	2.05	2.85
Antifoam B*	lb.	.68	1.20
Defoama W-1701*	lb.	——	.12½
Defoamer A-25*	lb.	——	3.00
Defoamer 630*	lb.	——	.14
Deltyl Prime	lb.	.70	.80
Foam-Nix*	lb.	.50	1.25
G-E Antifoam SS-24*; 66*	lb.	5.28	6.65
60 Emulsion*	lb.	2.05	3.75
Igepol CO-210	lb.	——	.36
Kessco X-3* (dms.)	lb.	——	.39
X-180*	lb.	——	.28
X-181*	lb.	——	.36½
Nopco 1407*	lb.	.19½	.21½
1497-V*	lb.	.14¼	.16¼
1907-B*	lb.	.22½	.24½
JMK*	lb.	.48½	.50½
JMU*	lb.	.23¼	.25¼
JMV*	lb.	.21	.23
Pluronic L61*	lb.	.33½	.39
RS-968*	lb.	.38	.38½
Terpinol Prime No. 1	lb.	.35	.50
Tributyl Phosphate (dms.)	lb.	.52½	.53½
UC SAG 47*	lb.	5.25	6.50
470*	lb.	.69	1.20
VL-520*	lb.	2.68	3.50

ANTIOXIDANTS

Agebest 1293-22A*	lb.	1.90	2.00
AgeRite Alba*	lb.	2.40	2.50
Gel*	lb.	.70	.72
Hipar*	lb.	1.05	1.07
H.P.*	lb.	.79	.81
Powder*	lb.	.57	.59
Resin*	lb.	.88	.90
Resin D*	lb.	.57	.59
Spar*	lb.	.57	.59
Stalite & Stalite S*	lb.	.57	.59
Superlite*	lb.	.57	.59
White*	lb.	1.50	1.60
Akroflex C*	lb.	.85	.87
CD*	lb.	.79	.81
Alcogard 354*	lb.	1.40	1.52
Aminox*	lb.	.57	.62
Antioxidant 425*	lb.	2.47	2.50
Antioxidant 2246*	lb.	1.50	1.53
Antox*	lb.	.59	.61
Aranox*	lb.	3.25	3.30
Benzoquinone	lb.	1.50	1.75
Betanox Special*	lb.	.91	.96
B-L-E*	lb.	.57	.62
B-X-A*	lb.	.55	.57
Catalin CAO No. 1*	lb.	.91	.95
CAO No. 3*	lb.	1.05	1.07
CAO No. 5*	lb.	1.49	1.50
CAO No. 6*	lb.	——	3.20
Deenax*	lb.	.95	1.05
Di-tert-Butyl-para-Cresol	lb.	.86	1.16
Eugenol C-95%*	lb.	2.30	2.50
Flectol H*	lb.	.57	.64
Flexamine*	lb.	.79	.84
Ionol* (dms.)	lb.	.91	.95
Neozone A*	lb.	.64	.66
C*	lb.	.86	.88
D*	lb.	.57	.59
Nevastain A*	lb.	.51	.61
B*	lb.	.51	.70
Nullapon BF-12*	lb.	——	.21½
BF-13*	lb.	——	.25½
BF-78*	lb.	——	.55
BF-Acid*	lb.	——	.85
Octamine*	lb.	.57	.62
Oxidex*	lb.	——	3.60
PDA-10*	lb.	.46	.48
Permalux*	lb.	——	2.25
Polygard*	lb.	.52	.62
Santoflex AW*	lb.	.71	.78
DD*	lb.	.57	.64
75*	lb.	1.01	1.08
Santovar-A*	lb.	1.55	1.62
Santowhite Crystals*	lb.	1.55	1.62
Santowhite L*	lb.	.57	.64
MK*	lb.	1.25	1.32
Powder*	lb.	1.55	1.62
Sequestrene AA*	lb.	.70	.80
NA2*	lb.	.59	.66
NA3*	lb.	.58	.65
Stabilite*	lb.	.57	.59
Alba*	lb.	.75	.80
FLX*	lb.	.78	.80
L*	lb.	.65	.67
White*	lb.	.57	.59
White Powder*	lb.	.46	.48
Stabilizer No. 1*	lb.	1.55	1.80
Stabilizer No. 9-A*	lb.	.80	1.05
Styphen I*	lb.	.51	.55
Sunolite*	lb.	.16	.22
Tecquinol*	lb.	.82½	.84½
Tannic Acid, Tech.	lb.	.46	.48
Tenamene 3*	lb.	.91	.95
Thermoflex A*	lb.	1.05	1.07
V-G-B*	lb.	.75	.77
Wing-Stay S*	lb.	.53	.57

ANTIOZONANTS

Eastozone* 30, 31	lb.	1.05	1.09
Fura-Tone NC-1008*	lb.	.28	.39
NC-1012*	lb.	.46	.69
Santoflex AW*	lb.	.79	.86
UOP 88* & 288* (dms.)	lb.	1.05	1.07

ANTI-SCORCHING AGENTS

Armeen HT*	lb.	.34	.40
Good-rite Vultrol*	lb.	.67	.70
Harcopol 1183*	lb.	.70	.74
Retarder PD*	lb.	.37	.39
W*	lb.	——	.46
Sodium Acetate 60-62% Crystals	lb.	.08	.08½

ANTISEPTICS AND GERMICIDES

A.P.C. 6901*	lb.	.32	.38
Arquad S*	lb.	.38	.44
Formaldehyde (dms.)	lb.	.06	.076
G-4* (bbls.)	lb.	1.09	1.29
G-11*	lb.	1.98	2.08
Halane*	lb.	.40	.47
Ortho Cresol (26°—27°)	lb.	.14	.16¼
Preventol GD	lb.	——	1.09
Retarder D*	lb.	.42	.50
Vancide	lb.	——	.80

ANTI-WEBBING AGENTS (for Latex)

DC 7 Compound*	lb.	5.05	6.50
Webnix 34-L*	lb.	1.25	1.75
57*	lb.	1.50	2.00
69-C*	lb.	1.50	2.00
71*	lb.	1.25	1.75

AROMATICS (DEODORANTS)

Airkem 115*	gal.	——	6.50
122*	gal.	——	6.50
186*	gal.	——	6.50
Alamask AA*	lb.	——	3.00
AF*	lb.	——	2.50
AO*	lb.	——	1.50
AR*	lb.	——	.50
BG*	lb.	——	1.15
BGM*	lb.	——	.60
CY*	lb.	——	2.40
DJ*	lb.	——	3.35
DL*	lb.	——	1.95
H*	lb.	——	5.50
LD*	lb.	——	.75
ND*	lb.	——	2.75
O*	lb.	——	6.50
OS*	lb.	——	5.25
Bouquet 149*	lb.	——	3.00
Coumarin*	lb.	——	3.70
Curodex 19*	lb.	4.75	4.90
188*	lb.	5.75	5.90
198*	lb.	6.75	6.90
Deodorant 65*	lb.	——	1.85
Deodorant L-37*	lb.	2.15	2.25
L-44*	lb.	2.65	2.75
N.L.T.X.*	lb.	1.90	2.00
Deodorant Oil GD 6422*	lb.	1.90	2.20
GD 6423*	lb.	1.60	1.90
GD 6575*	lb.	2.40	2.90
GD 31063*	lb.	2.25	2.75
Ethavan*	lb.	6.20	6.25
Latex Perfume 17326	lb.	——	4.00
18301	lb.	——	3.00
22258	lb.	——	2.50
Naugaromes* (dms.)	lb.	.60	3.00
Neutroleum Delta*	lb.	——	2.25
Gamma*	lb.	——	3.25
Parador A*	lb.	1.80	2.10
C*	lb.	2.00	2.50
E*	lb.	.25	.40
GD 5280*	lb.	2.00	2.50
GD 53481*	lb.	1.70	2.00
Perfume Oil Bouquet Vanilla M*	lb.	1.60	1.70
Rodo No. 0*	lb.	4.00	4.50
No. 10*	lb.	5.00	5.50
Rubbarome* (dms.)	lb.	.60	3.80
Rubber Perfume 12*	lb.	——	4.35
Russian Leather 7*	lb.	——	4.35
Vanillin	lb.	2.75	2.80

BLOWING AGENTS

Ammonium Bicarbonate	cwt.	——	8.00
Better Blend Soda* (c.l., bags)	cwt.	——	2.55
Blowing Agent No. 81105	lb.	.32	.35
Celogen*	lb.	——	1.95
AZ*	lb.	——	1.95
Diazo Amino Benzene	lb.	——	.73
Kempore R-125	lb.	——	1.92
Neo Fat 42-12*	lb.	.10¼	.12¼
Opex 40	lb.	.68	.72
Sodium Bicarbonate, U.S.P. (c.l., bags)	cwt.	——	2.40
Unicel ND*	lb.	——	.72
S*	lb.	——	.20
Urea	lb.	.06	.07

BONDING AGENTS

Base 6986*	lb.	.27	.32
Braze*	gal.	6.00	9.00
Chemlok 201, 203, 220, 401, 607	gal.	5.00	24.00
614	lb.	4.35	4.75
Cover Cement*	gal.	2.50	4.00
Durez 12987*	lb.	.47½	.51½
Gen-Tac Latex*	lb.	.70	.75
Hylene M*	lb.	1.70	2.00
M-50*	lb.	1.00	1.25
Penacolite B1A*	lb.	——	.95
R-2710*	lb.	——	.95
Pliobond 20*	gal.	2.91	4.23
30*	gal.	3.65	4.97

BONDING AGENTS (Cont'd)

Rex Compounds*	gal.	1.30	1.90
Thixons*	gal.	3.30	9.00
Ty-Ply Q (BN & S)*	gal.	6.75	8.00
Tygobond 30*	gal.	4.10	5.40
40*	gal.	5.80	6.89
41*	gal.	8.65	9.85
45*	gal.	5.75	6.48
Vinculux	gal.	——	4.95

COAGULANTS

Acetic Acid—56% (bbls. cwt		9.00	11.00
Glacial 99½% (dms.)	lb.	.12	.13
Calcium Nitrate, Tech. Flake	lb.	.07½	.09½
Hydroxyacetic Acid—70% (dms.)	lb.	——	.09½
Zinc Nitrate, Tech. Flake	lb.	——	.20

COLORING AGENTS

Black

Aquablak B*	lb.	.09¾	.10¾
M*	lb.	.10½	.11
S*	lb.	.11¼	.12¼
Black Shield 4*	lb.	.09	.09½
No. 5	lb.	.10	.10½
No. 6	lb.	.09	.09½
No. 19	lb.	.11	.11½
L-1404B	lb.	.10½	.11
Carbon Black—See *Reinforcing Agents*			
Cooke 1026*	lb.	——	2.50
Lampblack No. 10*	lb.	.06	.09
Mapico Black Iron Oxide* (50 lb. bags)	lb.	.14¾	.15
Pure Black Iron Oxide	lb.	.14¼	.14½

Blue

Akron Masterbatches*	lb.	2.23	2.78
Toners*	lb.	2.30	6.35
Blue Powders	lb.	2.20	3.75
Cooke M.B. Blue*	lb.	2.20	3.75
Disco Blues	lb.	2.20	3.45
Monastral Rubber Blue CPL*	lb.	1.95	1.95
PCD, Dispersed*	lb.	——	2.55
Peacoline Blue*	lb.	——	3.85
Ramapo Blue*	lb.	2.75	3.00
Rubber Blue GD* (Disp.)	lb.	——	4.75
Rubber Blue X-1999*	lb.	——	1.90
Rubber Dispersed Blues	lb.	2.52	2.78
Solfast Blue*	lb.	.75	3.60
Stan-Tone MBS*	lb.	2.20	2.85
GPE*	lb.	——	1.50
PEC*	lb.	.93	1.08
Ultramarine	lb.	.14	.30
Vansul Blue M.B.*	lb.	1.00	2.60

Brown

Brown Iron Oxide	lb.	.15¼	.15½
Mapico Brown* (50 lb. bags)	lb.	.15¾	.16
Stan-Tone GPE*	lb.	——	3.00
Vansul Brown M.B.* (Organic)	lb.	——	2.30

Green

Akron Masterbatches*	lb.	1.38	3.08
Toners*	lb.	1.35	4.95
Cooke M.B. Green*	lb.	1.60	2.80
1013*	lb.	——	2.80
Disco Greens	lb.	1.55	2.80
Green Powders	lb.	1.35	3.95
Monastral Rubber Green GSD* (Dispersed)	lb.	——	2.80
GSL*	lb.	2.20	2.20
Permansa Green CP-1236*	lb.	——	1.35
Pigment Green B*	lb.	1.45	1.45
GL-652D*	lb.	.90	.95
Ramapo Green*	lb.	——	3.50
Rubber Dispersed Greens	lb.	1.23	3.08
Rubber Green FD* (Disp.)	lb.	——	2.05
Rubber Green X-1292*	lb.	——	1.75
Solfast Green*	lb.	——	3.95
Stan-Tone MBS*	lb.	1.55	3.35
GPE*	lb.	——	3.00
PC*	lb.	2.20	2.25
Vansul Green M.B.*	lb.	1.50	3.00

Maroon

Akron Masterbatches*	lb.	——	4.10
Toners*	lb.	2.00	4.00
Pyrolux Maroon*	lb.	——	3.40
Vansul Maroon M.B.*	lb.	——	3.35

Orange

Akron Masterbatches*	lb.	2.42	2.77
Toners*	lb.	2.82	4.00
Benzidene Orange	lb.	——	3.30
Cooke MB*	lb.	2.25	2.35
1021*	lb.	——	2.25
Dianisidine Orange*	lb.	——	2.85
Disco Oranges	lb.	2.30	2.85
Mercadium X-2667*	lb.	——	1.61
Molybdate Orange	lb.	——	.48
Oswego Orange X2065*	lb.	——	3.15
Rubber Orange OD* (Disp.)	lb.	——	2.25
Stan-Tone Cadmium Dry*	lb.	1.85	4.23
Cadmium Paste*	lb.	2.48	2.80
GPE*	lb.	1.20	4.35
PC*	lb.	.75	.80
Vansul Orange M.B.*	lb.	2.40	2.45

FOR YOUR FINER, LIGHT-COLORED GOODS

Has a rapid incorporation rate. facilitates pigment dispersion. Does not retard the cure in the presence of organic accelerators. Prevents the sagging of extruded goods and stock contraction previous to the cure.

Dries out sticky compounds and prevents their adhering to mill and calender rolls.

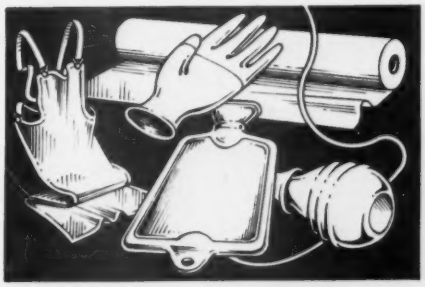
Saves considerably on white pigments and color.

Many more advantages on request.

ASK FOR FACTICE®

Amberex®

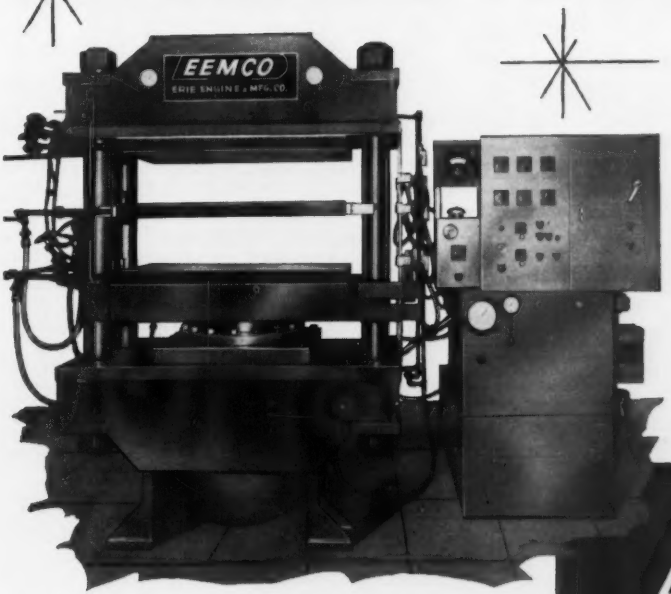
Feel free to submit your problems to us. Just explain your difficulty, or describe the effect you wish to achieve. Without obligation, our laboratory will gladly make helpful recommendations. Data on request any time.



Factice
THE STAMFORD RUBBER SUPPLY CO
Vulcanized Oil

THE STAMFORD RUBBER SUPPLY CO., STAMFORD, CONN.

HYDRAULIC PRESSES for Rubber and Plastics



Illustrated Compression Molding Press with 314 ton capacity. Platen sizes 45" x 30"—2-10" openings, with semi-automatic controls. EEMCO builds a complete line of Presses for Laminating, Transfer Molding and Reinforced Plastics.

. . . designers and builders of a complete line of MILLS and PRESSES

EEMCO

ERIE ENGINE & MFG. CO.

953 East 12th St., ERIE, PA.

COLORING AGENTS (Cont'd)

Red

Akron Masterbatches*	lb.	1.00	3.53
Toners*	lb.	.88	5.60
Arcturus Reds*	lb.	—	1.35
Antimony Trisulfide	lb.	.72	.78
R.M.P. Sulfur Free*	lb.	—	.78
R.M.P. No. 3*	lb.	—	.72
Brilliant Toning Reds*	lb.	1.65	1.90
Cadmolith Red* (dms.)	lb.	1.94	2.87
Cooke M.B. Red*	lb.	1.05	3.25
1010*	lb.	—	1.75
Disco Reds	lb.	1.05	3.25
Graphic Red* (dlvd.)	lb.	.98	1.03
Kroma Reds*	lb.	.14	.15
Lake Red C*	lb.	—	1.25
Mapico Reds* (50 lb. bags)	lb.	.14¼	.14½
Mercadium X-2668 Light*	lb.	—	1.68
X-2669 Medium Light*	lb.	—	1.76
X-2670 Medium*	lb.	—	1.83
X-2671 Dark*	lb.	—	1.91
Oximony Red Iron Oxide	lb.	.12¾	.13
Polaris Red*	lb.	—	1.70
Recco Red Oxide*	lb.	.12	.13
Red Iron Oxide, Light	lb.	.13¼	.14
Red Powders	lb.	—	4.40
Rubber Dispersed Reds	lb.	1.47	3.58
Rubber Red PBD* (Disp.)	lb.	—	2.05
2BD, Dispersed*	lb.	—	2.00
2BL*	lb.	1.24	1.24
PBL*	lb.	1.24	1.24
Rubanox Reds*	lb.	1.47	1.60
Rubber Red CP-339* (dlvd.)	lb.	—	1.10
Rubber Red X-1148*	lb.	—	.93
Solfast Red*	lb.	1.47	1.80
Stan-Tone MBS*	lb.	1.00	3.75
GPE*	lb.	.77	3.15
PC*	lb.	1.30	2.50
PDS*	lb.	1.40	1.55
PVC*	lb.	1.65	1.90
Vansul Red M.B.*	lb.	1.05	3.35
Watchung Red*	lb.	1.90	1.90

Tan

Mapico Tan 15* (50 lb. bags)	lb.	.23¼	.23½
20* (50 lb. bags)	lb.	.23¼	.23½

White—Lithopone

Eagle-Picher*	lb.	.0800	.0975
Permolith*	lb.	.0837½	.0912½
Sunolith*	lb.	.0800	.0875

White—Titanium Pigments

Iceberg*	lb.	—	.02½
Icecap K*	lb.	—	.03¼
Horse Head Anatase Grades*	lb.	.25½	.26½
Rutile Grades*	lb.	.27½	.28½
Stan-Tone PC*	lb.	.55	.60
Ti-Cal*	lb.	.09	.09¾
R-22*, R-25*, R-27*, R-30*	lb.	.09⅜	.09⅞
R-60*	lb.	.09⅜	.10⅛
Ti-Pure*	lb.	24½	27½
Anatase Grades*	lb.	25½	26½
R-100*, R-500*	lb.	.27⅝	.28½
Titanox A*—all grades (dlvd.)	lb.	.25½	.26½
C-50* (dlvd.)	lb.	.14⅜	.14⅞
RA* (dlvd.)	lb.	.27½	.28½
RA-10* (dlvd.)	lb.	.27½	.28½
RA-NC* (dlvd.)	lb.	.27½	.28½
RC* (dlvd.)	lb.	.09¾	.10¼
RC-HT* (dlvd.)	lb.	.09⅜	.09⅞
Unitane O-110*	lb.	.25½	.26½
O-220*	lb.	.25½	.26½
O-310*	lb.	.25½	.26½
O-410*	lb.	.25½	.26½
OR-150*	lb.	.27½	.28½
OR-250*	lb.	.27½	.28½
OR-340*	lb.	.27½	.28½
OR-342*	lb.	.27½	.28½
OR-350*	lb.	.27½	.28½
OR-540*	lb.	.27½	.28½
OR-640*	lb.	.27½	.28½
Zopaque*	lb.	.24½	.25½
R*	lb.	.26½	.27½

White—Zinc Oxide (American Process)

AZODOX 44, 45	lb.	.1450	.1550
AZO-ZZZ 11*, 22*, 33*, 44*, 55*	lb.	.1450	.1550
Eagle-Picher AAA*	lb.	.1450	.1550
Horse Head Special*	lb.	.1450	.1550
XX*	lb.	.1450	.1550
Protox 166*	lb.	.1450	.1550
167*	lb.	.1450	.1550
267* (pelleted)	lb.	.1450	.1550
St. Joe Black Label*	lb.	.1450	.1550
Green Label*	lb.	.1450	.1550
Red Label*	lb.	.1450	.1550
Pelleted	lb.	.1450	.1550

COLORING AGENTS (Cont'd)

White—Zinc Oxide (Dispersed)

Dispersed Zinc Oxide	lb.	—	.13

White—Zinc Oxide (French Process)

AZO-ZZZ 66	lb.	.1450	.1550
Florence Green Seal*	lb.	.1625	.1725
Red Seal*	lb.	.1575	.1675
White Seal*	lb.	.1675	.1775
Kadox 25*	lb.	.1675	.1775
15*, 17*, 72* & 515*	lb.	.1450	.1550
Protox 168*	lb.	.1450	.1550
169*	lb.	.1450	.1550
268* (pelleted)	lb.	.1450	.1550
U.S.P. (cartons)	lb.	.1775	.1875
XX-78*	lb.	.1450	.1550

White—Zinc Sulfide

Cryptone ZS*	lb.	.2530	.2630
Lehigh 35%*	lb.	.15125	.16125
50%	lb.	.15375	.16375

Yellow

Akron Masterbatch*	lb.	1.12	2.18
Toners*	lb.	2.10	6.00
Benzidene-Lightfast	lb.	3.40	5.35
Benzidine Yellow	lb.	1.41	2.55
Cadmolith Yellow (dms.)	lb.	1.12	1.20
Chrome Yellow	lb.	.35	.35
Cooke M.B. Yellow 405*	lb.	2.15	2.75
105*	lb.	—	2.15
Disco Yellows	lb.	2.05	3.95
Iron Oxide, Pure Light Shades	lb.	.12	.12¼
Dark Shades	lb.	.11½	.11¾
Mapico Yellow* (50 lb. bags)	lb.	.12	.12¼
Rubber Dispersed Yellows	lb.	1.27	2.13
Rubber Yellow GD* (disp.)	lb.	—	2.25
GL*	lb.	—	1.68
Rubber Yellow X-1940*	lb.	—	2.35
Stan-Tone Cadmium Dry*	lb.	2.80	2.98
Cadmium Paste	lb.	1.77	1.79
MBS*	lb.	1.30	2.20
GPE*	lb.	.77	3.25
PC*	lb.	.55	3.40
Toluidine Yellow	lb.	2.20	2.20
YL-660 D*	lb.	1.25	1.35
Oximony Iron Oxide	lb.	.12¾	.13
Vansul Yellow M.B.*	lb.	1.15	2.15
Yellow Powders	lb.	2.00	5.00
Zinc Yellow	lb.	.29	.29

DISPERSING AGENTS

Anchoid*(†)	lb.	.24	.25
Anhydrapent*	lb.	.56	.59
Armeen 18*	lb.	.39	.45
Belloid TD*	lb.	.15¾	.16¼
Blancol*	lb.	—	.15¾
Darvan No. 1*, No. 2*, No. 3*	lb.	.22	.30
Daxad 11* (21*, 23*)	lb.	.08	.30
Diethanolamine (dms., dlvd.)	lb.	.24½	.27
Dispersaid*	lb.	1.25	1.35
Emcol K-8300* (dms.)	lb.	.14	.18
P10-59	lb.	.32	—
5120	lb.	.31	—
5138	lb.	.31	—
Emulphor ON-870*	lb.	—	.55
Furala*	lb.	.06½	.07½
Halloid*	lb.	.04½	.05½
Igepal CO-630*	lb.	—	.29
Igepon T-73*	lb.	—	.29½
Kyro EO* (dms.)	lb.	—	.29¾
Leonil SA*	lb.	—	.55
Lipal No. 9-N*	lb.	.28	.29
11-O*	lb.	.28	.29
Lomar PW*	lb.	.15¼	.15¾
Marasperse C*	lb.	.06¼	.06¾
CB*	lb.	.13	.15
N*	lb.	.09½	.10½
Monoethanolamine (dms., dlvd.)	lb.	.25	.27½
Naccotan A*	lb.	.16½	.17
Nekal BA-75*	lb.	—	.40
BX-78*	lb.	—	.64
Nopco 1187-X*	lb.	.15	.16
Pluronic F68*	lb.	.38½	.44
Polyfon*	lb.	.08	.10
R & R 551*	lb.	—	.28
Ruhbex*	lb.	.247	.277
Stablex B*	lb.	.50	.95
Stan-Chem BQC*	lb.	.12¼	.17¼
1067*	lb.	—	.13½
1471*	lb.	.1687	.2187
2251*	lb.	.12¼	.17¼
Trenamine D-25*	lb.	.32½	.36
Triethanolamine (dms., dlvd.)	lb.	.22	.25½
Yelkin TT* (and TTS*)	lb.	.13	.16

EXTENDERS

Areco 1071-13B*	lb.	.14½	.15½
1073-18B*	lb.	.13½	.14½
1294-36B*	lb.	.11½	.12½
Car-Bel-Ex-A* (and B*)	lb.	—	.14
Extender 600*	lb.	—	.1870
Facile Gum 4A*	lb.	.48	.50
Millex*	lb.	—	.07
W*	lb.	—	.07

EXTENDERS (Cont'd)

Nopco 2271*	lb.	.16¾	.18¾
Polyco 418*	lb.	.17	.18
PR-162 Latex Extender*	lb.	—	.182
Solvitose HDF*	lb.	.22	.25
Synprolac*	lb.	.16	.23
Synprowax*	lb.	—	.23
Vistanex MM Grades*	lb.	—	.35

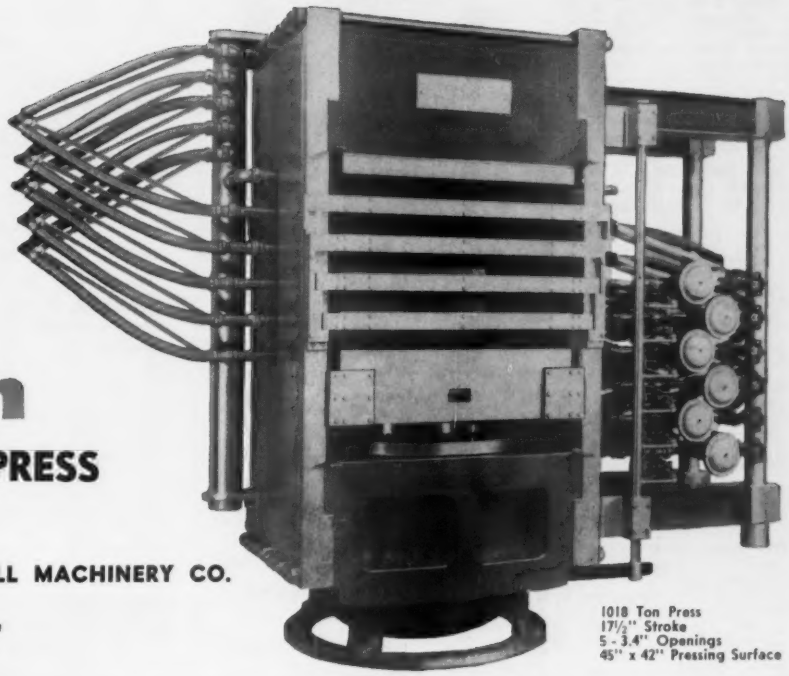
FILLERS (Inert and Reinforcing)

Abrasives			
Carbonite*	lb.	.21½	1.35
Lionite*	lb.	.16	1.27
Pumice	lb.	.03	.05
Walnut Shell Grits	ton	60.00	110.00
Aluminum Hydrate	lb.	.031	.170
Kaiser Alumina*	lb.	.026	.059
Aluminum Silicate			
AFD*	ton	29.50	36.00
Aluminum Flake*	ton	29.50	36.00
Marter White*	ton	18.50	30.00
Barium Carbonate (l.c.l.)	ton	109.00	126.50
Barytes			
No. 1 Floated, White*	ton	55.00	79.85
No. 2 Floated, Unbleached*	ton	50.00	74.85
No. 22 Barytes* (c.l.)	ton	—	30.00
No. 3805 Barytes*	ton	22.00	26.75
Foam A*	ton	—	55.00
Sparmite*	ton	80.00	90.00
XIOR*	ton	80.00	90.00
Bentonite (c.l.)	ton	—	13.50
Argosite Clay* (c.l.)	ton	—	12.50
Bennett Clay* (c.l.)	ton	—	32.50
SPV Volclay* (c.l.)	ton	—	13.50
White Hi-Gel*	ton	—	65.90
Blanc Fixe	ton	125.00	142.00
Calcium Carbonate			
Atomite* (c.l.)	ton	—	32.50
B.I. White No. 1 (c.l.	ton	—	10.00
Calcene NC*	ton	80.00	100.00
TM*	ton	82.50	102.50
Calwhite*	ton	—	20.00
Camel-Carb*	ton	—	14.00
Camel-Tex*	ton	—	22.00
Camel-Wite*	ton	—	35.00
CCO White*	ton	—	22.00
Duramite*	ton	—	20.00
Gamaco* (c.l.)	ton	—	32.50
Georgia Marble 5-25* (c.l.)	ton	—	20.00
No. 10 White* (c.l.)	ton	—	11.00
Kalite*	ton	52.50	67.50
Laminar*	ton	—	30.00
Leaxmite* (c.l.)	ton	—	27.50
Lorite*	ton	30.00	36.00
Millical*	ton	38.00	53.00
Multifex MM*	ton	117.50	137.50
Non-Fer-Al*	ton	35.00	50.00
Purecal M*	ton	56.75	80.75
SC* (and T*)	ton	110.00	125.00
U*	ton	120.00	135.00
PPTD* (c.l.)	ton	—	30.00
Rambo No. 1*	ton	—	11.50
Snowflake*	ton	—	20.00
Super Multifex*	ton	167.50	187.50
Surfex*	ton	42.00	57.00
Suspenso*	ton	38.00	43.00
Witcarb Reg.*	ton	60.00	85.00
*	ton	117.50	140.00
R*	ton	127.50	150.00
RC*	ton	117.50	140.00
York White*	ton	—	11.50
Calcium Silicate			
Silene EF*	lb.	.055	.065
Calcium Sulfate, Anhydrous			
Snow White Filler*	ton	—	22.00
Calcium Sulfate Hydrous			
Terra Alba No. 1*	ton	—	17.00
Chalk Whiting (l.c.l.)	lb.	.01½	.01¾
Recco Paris Whiting*	ton	—	35.00
OMYA Whiting*	ton	—	30.00
Clay			
Afton Clay*	ton	13.00	38.00
Aiken Clay*	ton	14.50	—
Alsilite* (c.l.)	ton	30.00	45.00
Aluminum Flake*	ton	25.50	28.50
Buca* (c.l.)	ton	—	45.00
Burgess No. 20*	ton	—	35.00
No. 30*	ton	—	37.00
Burgess Iceberg*	ton	—	50.00
Icecap K*	ton	—	65.00
Catalpo* (c.l.)	ton	—	35.00
Champion*	ton	—	14.50
Crown*	ton	—	14.00
Dixie* (c.l.)	ton	—	14.50
Franklin Clay—R* (c.l.)	ton	16.00	41.50
G. K. Soft*	ton	11.00	28.00
Harwick Clays*	ton	21.50	77.00
Hi-White R*	ton	14.50	—
Kaolloid Clay* (c.l.)	ton	—	10.50
LGB*	ton	17.50	22.50
LGP*	ton	20.00	25.00
McNamee* (c.l.)	ton	—	14.50
Natka 1200	ton	13.00	35.00
Par* (c.l.)	ton	—	13.00
Paragon*	ton	14.50	19.50
Pigment 5*	ton	27.50	34.50
33*	ton	—	37.00
Recco* (c.l.)	ton	—	14.50
Swanee Clay*	ton	—	12.50
Snobrite*	ton	—	12.50
Suprex*	ton	14.50	19.50
Whitetex* (c.l.)	ton	—	50.00
Windsor*	ton	14.50	39.50
4200 Clay*	ton	13.00	—

EVERY FRENCH PRESS

Is "Born" To Its Job!

This one was engineered to sustain profitable rates of floor tile production. Mail us your requirements: Our engineers take pride in a 50-year tradition of helping the rubber industry meet pressroom needs most economically.



1018 Ton Press
17½" Stroke
5 - 3.4" Openings
45" x 42" Pressing Surface

french

HYDRAULIC PRESS DIVISION

THE FRENCH OIL MILL MACHINERY CO.

1022 Greene St., Piqua, Ohio

Representatives Across The Nation
Boston—New York—Cleveland
Chicago—Denver—Los Angeles
Akron—Buffalo—Detroit

THE ANSWER

to Every OZONE Testing Problem

OZONE TEST CHAMBERS

OREC 0300 series ozone test chambers are entirely automatically controlled with panel instrumentation directly indicating in pphm/volume the ozone concentration at which the test chamber is operating. OREC 0300 series provide ozone concentrations required by all ASTM Specifications, as well as all known Producer, Consumer, and Military Specifications.

OZONE TESTING SERVICE

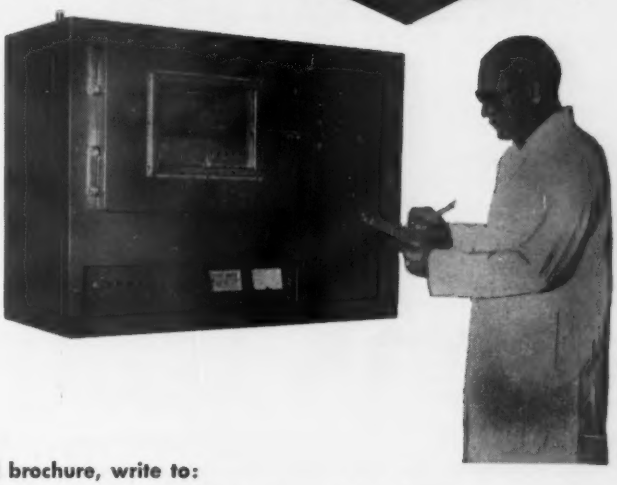
Accelerated ozone test chamber testing and Outdoor ozone testing in the stable desert climate of Phoenix, Arizona are provided at economical rates. Tests are conducted according to ASTM or customer specifications.

OTHER OZONE EQUIPMENT

Static and dynamic stretching apparatus for ozone testing, Laboratory Ozone Generators, Ozone Measurement Instrumentation, and Custom Ozone Apparatus.

AUTOMATICALLY CONTROLLED OZONE TEST CHAMBER

OZONE TESTING OF MATERIALS SERVICE



For illustrated brochure, write to:

Ozone Research and Equipment Corporation

3840 N. 40th Avenue **Phoenix, Arizona**

FILLERS (Cont'd)

Diatomaceous Earth	ton	30.00	- 50.00
Celite 270	ton	55.00	-121.00
292	ton	36.00	- 95.00
Kaylorite* (c.l.)	ton	——	- 30.00
Lorite*	ton	——	- 36.00
Flock			
Cotton (White)	lb.	.26	- .28
Colored	lb.	.12	- .26
Filfloc F 40-9000*	lb.	——	- .13
F 6000*	lb.	——	- .36
Polycel*	ton	110.00	-210.00
Rayon, Bleached or Dyed	lb.	.75	- 1.20
Rayon, Grey	lb.	——	- .18
Rayon, Pink	lb.	——	- .20
Solka-Floc* (l.c.l.)	lb.	.07	- .16
Glue, Amber	lb.	.17	- .19
Ground Softwood Bark			
Silvacon* (c.l.)	ton	55.00	-100.00
Leather			
Flour (dust)	lb.	.12	- .15
Shredded	lb.	.05	- .17
Lignin	lb.	.06	- .08
Indulin*	lb.	.06	- .08
Limestone, Pulverized	ton	3.00	- 5.00
Asbestol Regular*	ton	27.00	- 29.00
Asbestol Superfine*	ton	32.00	- 34.00
Georgia Marble No. 10*	ton	——	- 11.00
Industrial Filler No. 100*	ton	——	- 7.75
Micro Velva A*	ton	49.00	- 51.00
L*	ton	57.00	- 59.00
No. 1 White*	ton	——	- 11.00
Magnesium Carbonate	lb.	.10½	- .13
K & M Clearcarb*	lb.	——	- .14
Technical* (c.l., eqld.)	lb.	.10½	- .12
Marinco CL*	lb.	.11	- .13
Magnesium Silicate (see Talc)			
Mica	lb.	.01¼	- .07¼
Concord*	lb.	.08	- .08¾
Micro-Mica*	lb.	.08	- .08¾
Mineralite* (c.l.)	ton	40.00	- 85.00
Silversheen*	lb.	.08	- .08¾
Triple A Mica* (c.l.)	ton	——	- 35.00
Vermiculite*	lb.	——	- .11
Wet Ground Biotite Mica	lb.	.06½	- .07½
Wet Ground Mica No. 160*	lb.	.08	- .08¾
Pecan Shell Flour			
Stan Shell*	ton	45.00	75.00
Pyrophyllite			
No. 261*	ton	——	- 11.50
Pyrax A* (c.l.)	ton	14.50	- 15.00
WA* (c.l.)	ton	17.00	- 17.50
Sawdust, Graded	ton	14.00	- 35.00
Silica	ton	16.00	- 27.00
Extra Fine (bags) (c.l.)	ton	——	- 43.00
Slate, Powdered (l.c.l.)	ton	15.00	- 20.00
Lo-Micron Slate Flour*	lb.	——	- .04½
No. 133 Slate Flour*	ton	——	- 4.55
Sodium Silico Aluminate			
Zeolex 23*	lb.	.06	- .07
Talc (Magnesium Silicate)			
Asbestol Regular*	ton	——	- 27.00
Eastern RC-500*	ton	——	- 32.00
No. 41*	ton	——	- 19.70
No. 549*	ton	——	- 63.00
French*	ton	——	- 59.00
No. 367*	ton	——	- 13.00
No. 1600*	ton	——	- 70.60
No. 1768*	ton	——	- 13.00
Nytal 200* (c.l.)	ton	——	- 28.00
300* (c.l.)	ton	——	- 38.00
Sierra Fibrene C-400*	ton	33.00	- 38.00
Sierra Supreme 325*	ton	48.75	- 57.25
Sierra White*	ton	20.75	- 31.75
Soapstone*	ton	——	- 13.00
Walnut Shell Flour	ton	55.00	-100.00
Agrashell*	ton	55.00	-115.00
Stan-Shell*	ton	50.00	-100.00
Whiting, Commercial	ton	——	- 7.50
Allied Whiting*	ton	10.50	- 21.50
Camel-Carb*	ton	——	- 10.00
Calwhite (c.l.)	ton	——	- 20.00
C-C-O White*	ton	——	- 22.00
Georgia Marble No. 15*	ton	——	- 20.00
No. [illegible]*	ton	——	- 20.00
Pigua No. 1 VAA* (c.l.)	ton	10.00	- 10.00
No. 2 LS* (c.l.)	ton	10.00	- 10.00
Snowflake* (c.l.)	ton	——	- 20.00
Stan-White 325*	ton	11.50	- 14.10
Ultrasil*	lb.	.35	- .50
Veroc* (c.l.)	ton	——	- 11.50
Welco* (c.l.)	ton	——	- 10.50
York White R* (c.l.)	ton	——	- 11.00
Wood Flour	ton	31.50	- 48.00

FINISHING MATERIALS, SURFACE

Beaco Finishes*	gal.	2.10	- 2.35
Black Out*	gal.	4.50	- 8.00
Shellac, Orange Gum	lb.	.40	- .50
VanWax*	gal.	1.45	- 1.50

FLAME RETARDANTS

Celluflex CEF* (dms.)	lb.	——	- .65
Chlorowax 40*	lb.	.15	- .17½
50*	lb.	.16	- .18½
70*	lb.	.18½	- .20
Halowax*	lb.	.36	- .46
Zinc Borate 3167*	lb.	.1920	- .2020
Zyrox Compounds*	lb.	.38	- .95½

LATEX MODIFIERS

Ludox	lb.	.15	- .16¼
OPD-101*	lb.	.29	- .36
Piccopale A-1 Emulsion	lb.	.086	- .113
Ubatol U-2001* (t.c.)	lb.	.166	- .187
U-2003* (t.c.)	lb.	.184	- .208
U-2007* (t.c.)	lb.	.166	- .187
U-3025* (c.l.)	lb.	.223	- .235
U-3040* (c.l.)	lb.	.260	- .272
U-3045* (c.l.)	lb.	.260	- .272
U-3050* (c.l.)	lb.	.195	- .207

LUBRICANTS, MOLD

Akro Gel*	lb.	——	- .165
Alipal CO-433*	lb.	——	- .20
CO-436*	lb.	——	- .24
Aluminum Stearate Crown Brand*	lb.	.37	- .42
Amine, Mixed Crude*	lb.	.19	- .25
Aquadag*	lb.	3.50	- 4.00
Aquarex D*	lb.	——	- .81
L*	lb.	——	- .94
ME*	lb.	——	- .82
MDL*	lb.	——	- .33
WAQ*	lb.	——	- .22
Armeen HT*	lb.	.34	- .40
180*	lb.	.52	- .56
Armid HT (flaked)*	lb.	.42	- .46
0*	lb.	.39	- .41
Borax, Granular (l.c.l.)	ton	89.00	- 94.00
Carbowax 4000*	lb.	.31	- .32
CD Mold Release B*	gal.	5.00	——
B-2*	gal.	5.00	——
Colite Concentrate* (dms.)	gal.	.90	- 1.15
Colite D43D*	gal.	1.15	- 1.40
Concentrex*	lb.	——	- .25
Dag Dispersions No. 197*	lb.	1.85	- 2.90
D.C. 7 Compound*	lb.	5.05	- 6.50
D.C. Emulsion No. 7*	lb.	1.59	- 2.07
No. 8*	lb.	1.20	- 1.74
No. 35*	lb.	1.20	- 1.74
No. 35A*	lb.	1.20	- 1.74
No. 35B*	lb.	1.20	- 1.74
No. 36*	lb.	1.20	- 1.74
D.C. Mold Release Fluid*	lb.	3.04	- 3.61
Dri-Lube*	lb.	——	- .22
Dryflo* (bags)	lb.	21.40	- 21.55
Emulsion Lubricant A80*	lb.	——	- 1.20
45*	lb.	——	- 1.20
G-E Silicone Emulsion SM-55*	lb.	1.18	1.74
SM-61*	lb.	1.18	- 1.74
SM-62*	lb.	1.18	- 1.74
G-E Silicone Fluid SF-92*	lb.	3.04	- 4.25
SF-96*	lb.	3.04	- 4.25
Hawkeye Flake* (dlvd.)	lb.	.15	- .15¾
HSC No. 35*	lb.	1.22	- 2.46
No. 515	lb.	1.22	- 2.46
Igepal CO-430*	lb.	——	- .29
CO-630*	lb.	——	- .29
CO-530*	lb.	——	- .29
Igepon AP-78*	lb.	——	- .48
T-33*	lb.	——	- .21
T-51*	lb.	——	- .13½
Kokobace R*	lb.	.17½	- .18½
Lipal 9-N*	lb.	.28	- .29
7-O*	lb.	.29	- .30
Lubrex	lb.	.25	- .30
Lubri-Flo*	gal.	10.00	- 12.00
Migralube*	lb.	——	- .35
ML-1027-2C*	gal.	——	- 2.65
ML-1028-2C*	gal.	——	- 2.65
Mold Lubricant No. 72 Conc.* (dms.)	gal.	——	- 1.90
Mold Lubricant No. 735* (dms.)	gal.	——	- 1.25
No. 769* (dms.)	gal.	——	- 1.20
No. 825* (dms.)	gal.	——	- 2.00
No. 856* (dms.)	gal.	——	- 1.90
No. 880* (dms.)	gal.	——	- 1.19
No. 887* (dms.)	gal.	——	- 1.80
No. 935* (dms.)	gal.	——	- 1.56
No. 956* (dms.)	gal.	——	- 2.50
No. 965* (dms.)	gal.	——	- 2.15
No. 967* (dms.)	gal.	——	- 2.40
No. 969* (dms.)	gal.	——	- 1.50
No. 975* (dms.)	gal.	——	- 2.85
No. 980* (dms.)	gal.	——	- 1.53
No. 987* (dms.)	gal.	——	- 2.45
A 187* (dms.)	gal.	——	- 1.90
A 256* (dms.)	gal.	——	- 1.20
A 988* (dms.)	gal.	——	- 2.60
Moldeze No. 3*	gal.	——	- 4.95
Mold-Brite*	gal.	——	- 1.50
Monopole Oil MD*	lb.	——	- .16
MR-22 Silicone Semi-Permanent	gal.	9.95	- 14.95
Olate Flakes*	lb.	.23½	- .24¼
Orvus WA Paste* (dms.)	lb.	——	- .23¼
Plaskon Polyethylene S*	lb.	.32	- .47
Poly-Brite PE-20	lb.	.28	- .42
600	lb.	.42	- .58
Poly-Cone 125X	lb.	1.20	- 1.40
1,000	lb.	.93	- 1.06
Polyglycol 15-200*	lb.	.25	- .28¼
E4000*	lb.	.31	- .37
Prodag*	lb.	.30	- .52
Purity Flake* (dlvd.)	lb.	.18¾	- .19¾
Rubber-Flo*	gal.	1.25	- 2.00
Rubber-Glo*	gal.	——	- .94
Rusco Mold Paste*	lb.	——	- .25
Sericite* (l.c.l.)	ton	65.00	- 75.00
Silicone Oil A145*	lb.	3.22	- 3.61
A220* (dms.)	lb.	——	- 2.80
Silrex (dms.)	lb.	——	- .65
A65*	lb.	2.50	- 2.75

LUBRICANTS, MOLD (Cont'd)

Soybean Lecithin	lb.	.13	- .17
Thermalube*	lb.	——	- .13¾
UC Silicone L-45*	lb.	3.04	- 4.75
L-522*	lb.	2.68	- 3.50
LE-45*	lb.	1.20	- 1.70
LE-450*	lb.	1.20	- 1.70
Ucon Lubricants*	lb.	.26¼	- .27¼
Ulco Mold Soap*	lb.	.19	- .29

LUBRICANTS, RUBBER

Diglycol Stearate Neutral (and SE) (dms.)	lb.	——	- .25
Extrud-o-Lube*	gal.	1.33	- 1.54
G.B. Naphthenic Neutrals*	gal.	.11	- .18
Ivory Chips*	lb.	.19¾	- .20¾
Latex-Lube GR* (dlvd.)	lb.	.19¼	- .20
No. 82-A* (450 lb. dms.)	lb.	——	- .08½
Propylene Stearate (dms.)	lb.	.35	- .60

LUBRICANTS, RUBBER SURFACE

Barium Stearate	lb.	.41	- .46
Calcium Stearate	lb.	.39	- .44
Crown Brand*	lb.	.37	- .42
D.C. 7 Compound*	lb.	5.05	- 6.50
D.C. 200 Fluid*	lb.	3.04	- 3.61
ELA*	lb.	——	- .82
G-E Silicone Fluid SF-92*	lb.	3.04	- 4.25
Glycerized Lubricant*	gal.	1.25	- 1.48
Glydag B*	lb.	1.50	- 2.10
Glyso-Lube* (dms.)	lb.	——	- .14
No. 3* (dms.)	lb.	——	- .14
HSC No. 35*	lb.	1.28	- 1.34
No. 515*	lb.	1.28	- 1.34
Hydro-Zinc*	lb.	——	- .20
Latex-Lube Pigmented* (dlvd.)	lb.	.17¼	- .18¼
R-66*	lb.	——	- .16½
Liqui-Lube* (dlvd.)	lb.	——	- .16¼
N.F.* (dlvd.)	lb.	——	- .16¼
N.T.* (dlvd.)	lb.	——	- .16¼
Lubrex*	lb.	.25	- .30
Lubri-Cote	gal.	.86	- 1.00
Magnesium Stearate	lb.	.42	- .47
Crown Brand*	lb.	.40	- .45
Polyethylene Glycol	lb.	.22	- .26
Rubber Free (Concentrate)*	gal.	——	- 1.44
Jel*	lb.	.18	- .21½
Separex*	lb.	——	- .10½
Slab-Dip* (dms.)	lb.	——	- .17
Soybean Lecithin	lb.	.13	- .17
Stock-Lube*	lb.	——	- .19
UC XL-42*	lb.	3.14	- 4.75
XLE-42*	lb.	1.22	- 1.70
XLE-420*	lb.	1.22	- 1.70
Zinc Stearate	lb.	.41	- .46

MOLD CLEANERS

Actusol* (dlvd.)	gal.	1.45	- 1.65
Alkon* (dlvd.)	lb.	.16	- .16½
CA-301*	gal.	——	- 2.49
CA-302*	gal.	——	- 2.63
G-O 6910*	lb.	.38	- .40
Metso Anhydrous*	cwt.	5.70	- 7.95
Metso 99*	cwt.	5.00	- 7.25
200*	cwt.	6.70	- 8.95
Granular*	cwt.	4.45	- 6.70
Orvus Extra Granules*	lb.	.23¼	- .24¼
Polo*	lb.	.12¾	- ——
Rubber-Sol*	gal.	2.97	- 3.97
Shelblast*	lb.	.04	- .08¼
Sprex A.C.* (dlvd.)	lb.	.17¾	- .18¾
Zip Mold Cleaner*	gal.	1.05	- 1.55

PEPTIZING AGENTS

Peptizer P-12*	lb.	.95	- 1.25
Pepton 22 Plasticizer*	lb.	.83	- .86
65*	lb.	1.23	- 1.26
65B*	lb.	.83	- .86
Pitt-Consol 640 (dms.)	lb.	.37	- .42
RPA 2*	lb.	——	- .85
3*	lb.	——	- .51
3 Conc.*	lb.	——	- .85
5*	lb.	——	- 1.10
6*	lb.	——	- 1.66

PLASTICIZERS & SOFTENERS

Acto 500*	lb.	——	- .09
Adipol BCA*	lb.	.45	- .45½
2EH*	lb.	.42½	- .43½
10A*	lb.	.42½	- .43½
ODY*	lb.	.45½	- .46½
810*	lb.	.42½	- .45¼
XX*	lb.	.42½	- .43½
Admex 562 (dms.)	lb.	.50¼	- .51¼
710 (dms.)	lb.	.35¼	- .36¼
711 (dms.)	lb.	.37¼	- .38¼
744 & 745 (dms.)	lb.	.41¼	- .42¼
760 (dms.)	lb.	.59¼	- .60¼
761 (dms.)	lb.	.46¼	- .47¼

ENDURA

takes pride in it's . . .

PROVEN ABILITY

to "toughen up" paper . . . . make it more durable, flexible and adaptable for a wide variety of uses.

ENDURA is the leading supplier to the pressure-sensitive tape industry. It pioneers many of the technical advances in this field.
Its facilities, resources and technical know-how are always available for new ideas.

ENDURA®

Impregnated and Coated Papers

Quakertown 27, Pa.

RC

for low temperature Elastomers

PLASTICIZERS

* **RC Plasticizer TG-8** (Triethylene Glycol Dicaprylate)
* **RC Plasticizer TG-85** (Triethylene Glycol Caprate-Caprylate)
* **RC Plasticizer TG-9** (Triethylene Glycol Dipelargonate)
* **RC Plasticizer DOA** (Dioctly Adipate)
* **RC Plasticizer DOS** (Dioctly Sebacate)
* **RC Plasticizer DBP** (Dibutyl Phthalate)
* **RC Butyl Oleate**

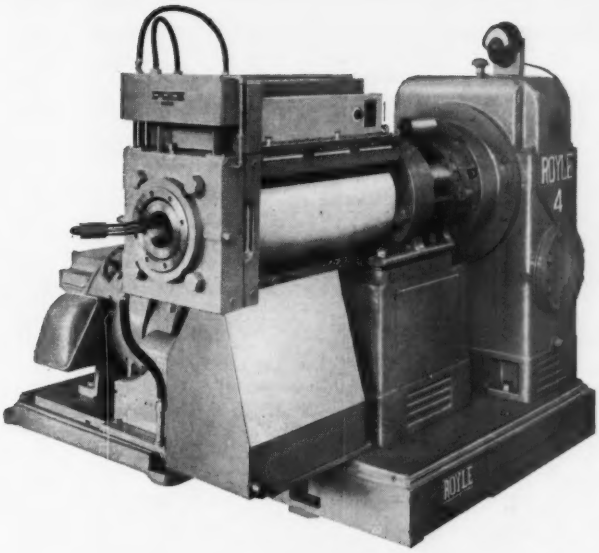
For use in GR-S, Neoprene, Buna N and natural rubber compounds to reduce nerve and produce superior flex and smooth extrusions. Write for samples!

Ready . . . Reliable . . . RC serving American industry since 1930.

RUBBER CORPORATION OF AMERICA

New South Road, Hicksville 2, N. Y.

Sales Offices: New York • Akron • Chicago • Boston



ROYLE SPIROD®

For Maximum Versatility

Whether you are extruding plastics that require high processing temperatures or quick-curing compounds Royle Spirod —the all purpose, all-electric, completely automatic extruder —provides positive temperature control. This versatility is the result of combining a proportioning controlled system of high velocity evaporative cooling with tubular resistance heating to supply constant, accurately zoned processing temperatures.

Send for Bulletin Number 463

JOHN ROYLE & SONS

ROYLE PATERSON N. J. 1880

PIONEERED THE CONTINUOUS EXTRUSION PROCESS IN

London, England
James Day (Machinery) Ltd.
Hyde Park 2430 - 0456

Home Office
V. M. Hovey J. W. VanRiper
SHerwood 2-8262

Akron, Ohio
J. C. Clinefelter Co.
BLackstone 3-9222

Downey, Cal.
H. M. Royal, Inc.
TOpax 1-0371

Tokyo, Japan
Okura Trading Co., Ltd.
(56) 2130 - 2149

PLASTICIZERS & SOFTENERS (Cont'd)

Anhydrol 6990*	lb.	.51	.56
Arneel SD*	lb.	.34	.40
Arolene 1980* (c.l.)	lb.	—	.10
Aromatic Plasticizer 10* (and 25*) (dms.)	lb.	.06	.07½
Aromatic Tar	gal.	.0573	.1973
Bardol*	lb.	.02¾	.03¾
B*	lb.	.06¼	.06½
Bayol D*	gal.	—	.382
F*	gal.	—	.52
Bearflex 1751*	lb.	.15	.18½
Beeswax, Bleached	lb.	73	.75
Yellow Refined	lb.	.64	.65
Bondogen*	lb.	.55½	.60½
B.R.C. No. 20*	lb.	.0150	.0175
No. 21*	lb.	.02¼	.03
No. 22*	lb.	.02½	.02¾
B.R.H. 2*	lb.	.0213	.0351
BRS 700*	lb.	.0200	.0285
B.R.T. 3*	lb.	.0180	.0265
4*	lb.	.0250	.0260
7*	lb.	.0300	.0310
B.R.V.*	lb.	.0475	.0565
Bunarex Resins*	lb.	.07	.08
Bunatak AH*	lb.	—	.09½
N*	lb.	—	.31
U*	lb.	—	.17½
No. 90*	lb.	—	.09
No. 210*	lb.	—	.14
Butac*	lb.	.12½	.13½
Butyl Carbitol Perlargonate (dms.)	lb.	—	.64½
Butyl Cellosolve Perlargonate (dms.)	lb.	—	.68
Butyl Oleate	lb.	.25½	.26½
Butyl Palmitate	lb.	—	.26½
Butyl Stearate (dms.)	lb.	.22¼	.25¼
Califlux 510* (and 550*)	lb.	.02¾	.03¾
G.P.*	lb.	.01½	.02½
R-100*	lb.	.04¾	.05¾
TT*	lb.	.0195	.0295
Candelilla Wax, Prime	lb.	.53	.64
Refined Light	lb.	.56	.57
Carbowax 4000* (dms.)	lb.	.68	.70
Cardolite NC-103*	lb.	.36	.59
Carnauba Wax, Crude	lb.	.72	.74
Flaked	lb.	.73	1.25
Refined, Technical	lb.	.73	.74
Refined, Pure	lb.	.80	.88
Yellow	lb.	1.22	1.26
Celluflex* (dms.)			
112* (t.c., dlvd.)	lb.	—	.32½
179-A* (t.c., dlvd.)	lb.	—	.32½
179-C* (t.c., dlvd.)	lb.	—	.32½
179-EG* (t.c., dlvd.)	lb.	—	.32½
DBP* (t.c., dlvd.)	lb.	—	.30
DOP* (t.c., dlvd.)	lb.	—	.28½
TPP* (dms., eqld.)	lb.	—	.40
Ceresin Wax	lb.	.12	.30
Chlorowax 40*	lb.	.15¼	.17½
50*	lb.	.16	.18½
70*	lb.	.18½	.20
LV*	lb.	.16	.19½
CTLA Polymer*	gal.	.20	.36
Cumar Resins*	lb.	.07	.19
Darex DBM*	lb.	.30½	.34
DBP*	lb.	.30	.33½
DOP*	lb.	.30½	.33½
DIOP*	lb.	.30½	.33½
D.B.M.*	lb.	.32	.34¼
Decylbutyl Phthalate	lb.	.27	.29½
Degras, Common	lb.	—	.14
Diallyl Phthalate	lb.	.51½	.52½
Dibenzyl Sebacate (dms.)	lb.	.93	.93½
Dibutoxyethyl Sebacate	lb.	—	.56¾
Dibutyl Phthalate (dms.)	lb.	.28½	.30
Dibutyl Sebacate	lb.	.67½	.68½
Dicapryl Adipate (dms.)	lb.	.41½	.42½
Dicapryl Phthalate (dms.)	lb.	.29	.30
Dicapryl Sebacate	lb.	.58	.59½
Di-Carbitol Phthalate (dms.)	lb.	.49	.49½
Dicyclohexyl Phthalate	lb.	.58¼	.59¼
Diethyl Phthalate (dms.)	lb.	.27½	.29
Di-2-ethylhexyl Phthalate (dms.)	lb.	.27½	.29
Dihexyl Adipate (dms.)	lb.	.46½	.47½
Dihexyl Phthalate (dms.)	lb.	.32½	.33½
Dihexyl Sebacate (dms.)	lb.	.66	.66½
Diisobutyl Azelate	lb.	—	.47¾
Di-iso-octyl Adipate	lb.	.42½	.43½
Dimethyl Phthalate (dms.)	lb.	.27½	.29
Dimethyl Phthalate	lb.	.32	.33
Dimethyl Sebacate (dms.)	lb.	1.30	1.30½
Dinonyl Adipate	lb.	.44½	.47½
Dinopol 235*	lb.	.36	.37
IDO*	lb.	.31	.32
MOP*	lb.	.31½	.32½
Dioctyl Adipate (dms.)	lb.	.42½	.43½
Dioctyl Phthalate (dms.)	lb.	.30½	.31½
Dioctyl Sebacate (dms.)	lb.	.61¼	.61¾
D.I.O.P. (dms.)	lb.	.30½	.31½
Dipolymer Oil	gal.	.33	.48
Dispersing Oil No. 10*	lb.	.06	.06¼
Dutrex* 1, 6, 7	gal.	.18	.23
6H	gal.	.13	—
15E	gal.	.11	.23
20, 25	gal.	.03	.06
33	gal.	.21	.33
Elastex 10-P*	lb.	.30½	.33½
50-B*	lb.	.25	.28
DCHP*	lb.	.59	.60
Emulphor EL-719*	lb.	—	.58
Epoxy Plasticizer	lb.	.33½	.36
Drapex 3.2*	lb.	.39¼	.40¼
Drapex 4.4*	lb.	.34¾	.35¾
Drapex 7.7*	lb.	.37	.38

PLASTICIZERS & SOFTENERS (Cont'd)

Esparto Wax	lb.	—	.55
Estac*	lb.	—	.16
Facile Gum 4A*	lb.	.48	.50
Flexol B-400*	lb.	.27½	.28½
DOP*	lb.	.30½	.31½
TOF*	lb.	.45½	.46½
3GH*	lb.	.46	.46¾
3GO*	lb.	.55	.55¾
4GO*	lb.	.35	.36
426*	lb.	.29½	.30½
Flexricin P-1*	lb.	.33½	.36½
P-4*	lb.	.30½	.33¼
P-6*	lb.	.37	.40
P-8*	lb.	.30¼	.33¼
Fortex A* (dms.)	lb.	.12½	.14½
Fura-Tone NC-1008*	lb.	.28	.39
Galex W-100*	lb.	.15½	.19¼
G.B. Asphaltic Flux*	gal.	.0970	.1770
G.B. Light Process Oil*	lb.	.02¾	.03¾
Medium Process Oil*	lb.	.03¾	.04¾
G.B. Naphthenic Neutrals*	gal.	.12½	.21½
Good-rite GP233*	lb.	.40	.43½
GP235*	lb.	.40	.43½
GP236*	lb.	.40	.43½
GP261*	lb.	.28	.31½
GP265*	lb.	.28½	.32
GP266*	lb.	.29	.32½
GP-266-BPA*	lb.	.29	.32½
Halleo C-255-NS*	gal.	.27½	.29½
C-566*	lb.	.11	.13
Harflex 300* (dms.)	lb.	.60½	.61½
325* (dms.)	lb.	.45	.46
375* (dms.)	lb.	.76	.77
500* (dms.)	lb.	.34	.35
HB20*	lb.	.15	.17
HB40*	lb.	.21	.22
Herron-H.T.*	gal.	.16	.27
Herron-Plas*	lb.	—	.03¼
Herron-Wax*	lb.	.05¼	.06
No. 23*	lb.	.08¼	.08¾
No. 24*	lb.	.07¼	.07¾
HSC No. 13*	lb.	.25	.32
No. 28 and 38*	lb.	.20	.27
Indonex 632½* (633½*, 634½*, 637½*)	gal.	.12	.19
Isooctyl Decyl Phthalate (dms.)	lb.	.31	.32
Kapsol*	lb.	.35	.35½
Kenflex A & N*	lb.	.19	.34
Kesscoflex BCL* (dms.)	lb.	—	.37
BCO* (dms.)	lb.	—	.33
BCP* (dms.)	lb.	—	.36
BCS* (dms.)	lb.	—	.32
BO* (dms.)	lb.	—	.28¼
BS* (dms.)	lb.	—	.27½
DBT* (dms.)	lb.	—	.68
DIOA* (dms.)	lb.	—	.43½
DOA* (dms.)	lb.	—	.43½
MCO* (dms.)	lb.	—	.35½
MCP* (dms.)	lb.	—	.41
MCS* (dms.)	lb.	—	.35
TRA* (dms.)	lb	—	.40
KP 23*	lb.	.31½	.32½
90*	lb.	.42½	.43½
140*	lb.	.48	.48½
201*	lb.	.58	.59
220* & 260*	lb.	.35½	.36½
666*	lb.	.59½	.60
Kremol 40*	gal.	.36	.46
50*	gal.	.39	.49
Kronisol* (dms.)	lb.	.33	.36
Kronitex AA* (dms.)	lb.	.35	.36
I* (dms.) and K-3*	lb.	.35	.36
MX*	lb.	.35	.36
Lanolin, Tech. Anhydrous	lb.	—	.26
Latex-Lube G.R.*	lb.	.19¼	.20
Lead Oleate	lb.	—	.29¾
Lindol* (dms., t.c.)	lb.	—	.32½
Locusol No. 1-6980*	lb.	.30	.34
2-Mercaptoethanol (dms.)	lb.	1.25	1.50
Methox*	lb.	.40½	.41
Methyl Laurate	lb.	.25	.27
Methyl Oleate	lb.	—	.20
Methyl Stearate (dms.)	lb.	—	.30
Monoplex DOS*	lb.	.59½	.60½
DBS*	lb.	.65½	.66½
S-70*	lb.	.41	.42
S-71*	lb.	.46½	.47½
Montan Wax, Crude	lb.	.22	.29
Flaked	lb.	.29	.29
Morflex*	lb.	.32	.69½
Natac*	lb.	.12	.13
Nebony Resins* (dms.)	lb.	.04½	.05
Neolene 210* (t.c.)	lb.	—	.16
212* (t.c.)	lb.	—	.14
220* (t.c.)	lb.	—	.15
Nerium*	lb.	—	.09
Nevillac Resins* (dms.)	lb.	.31	.85
Neville LX-880* (dms.)	lb.	.12	.13½
LX-685* (dms.)	lb.	.12½	.17½
Neville Resins* (dms.)	lb.	.07¼	.20
Nevindene Resins* (dms.)	lb.	.16½	.20
Nevinol* (dms.)	lb.	—	.24
Nuba 1* (and 2*) (dms.)	lb.	.06¼	.06¾
No. 480 Oil Proof Resin*	lb.	—	.18
Ohopex Q10* (dms.)	lb.	.30½	.31½
R9* (dms.)	lb.	.37¾	.37¾
Ortho-Nitrobiphenyl	lb.	.13	.15
Ozokerite Wax, White and Yellow	lb.	.24	.31
Paradene Resins (dms.)	lb.	.07¼	.08
No. 2 Flaked	lb.	.08	.08½
Para Flux* (dms.)	gal.	.22	.25
2016* (dms.)	gal.	.22	.26
Para Lube* (t.c.l.)	lb.	.046	.048

PLASTICIZERS & SOFTENERS (Cont'd)

Paraplex G-25*	lb.	.76	.77
G-40*	lb.	.50	.51
G-50*	lb.	.40¾	.41¾
G-53*	lb.	.45	.46
G-60* (and G-61*)	lb.	.35	.36
G-62*	lb.	.37	.38
Parmo*	lb.	.06	.13½
Petrolatum (dms.)	lb.	.04¼	.14½
PG-16*	lb.	—	.35
Philrich-5* (t.c.)	gal.	—	.12½
Picco 10* (and 25*)	lb.	.15	.15½
60* (and 75*)	lb.	.14½	.15
100*	lb.	.14½	.17
Piccocizer 30*	lb.	.05½	.07
Piccolastic A* (B*, C*, D* & E*)	lb.	.24	.25
FT* (FHX* & FX*)	lb.	.1695	.1745
T-135*	lb.	.19	.20
Piccolyte S Resins*	lb.	.20½	.23½
Piccopale Resins*	lb.	.12	.13
Piccoumaron Resins*	lb.	.07	.24½
Pigmentar* Pigmentaroil*	lb.	.0460	.0634
Plastac M*	lb.	—	.09¼
Plasticizer 2286*	lb.	—	.26¼
Plasticizer 4141*	lb.	.42½	.43½
Plasticizer DP-200, DP-250, DP-520*	lb.	.45	.45¾
DP-316*	lb.	.32¾	.33½
DP-317*	lb.	.46	.47¼
DP-8732*	lb.	.44¾	.46
Plasticizer LP*	lb.	—	.07
Plasticizer MP*	lb.	—	.08
Plasticizer MT-511*	lb.	—	.68¾
Plasticizer ODN*	lb.	.35	.41
Plasticizer SC*	lb.	.40½	.42
Plasticizer W-13*	lb.	.37	.38¾
Plastoflex 3*	lb.	—	.52
52*	lb.	.37¾	.38¾
VS*	lb.	.41¾	.42¾
Plastogen*	lb.	.08¾	.09
Plastolein 9050* (c.l.)	lb.	.54½	.56½
9055*	lb.	.30½	.32½
9058*	lb.	.48	.50
9250*	lb.	.38¾	.40¾
9715*	lb.	.39	.40
Plastone	lb.	.23	.27
Polycizer 162*	lb.	.27½	.28½
332*	lb.	.29	.32½
562*	lb.	.28	.29
662*	lb.	.28	.29½
532 and 632*	lb.	.40	.41¾
ED*	lb.	—	.51
Polyco 438*	lb.	.34	.35
Polymel C-130*	lb.	.13¾	.14¾
D*	lb.	.22½	.23½
6*	lb.	.05¾	.07¾
Poly-Sperse AP-2	lb.	.23	.29½
AP-300, LC-20	lb.	.26	.32½
Poly-Sperse R-100	lb.	.17	.23½
Process Oil C-255* (c.l.)	gal.	.27½	.29½
Propylene Stearate (dms.)	lb.	—	.32
PRR 1*	gal.	.15	.35
PT 101 Pine Tar Oil* (t.c., dms.)	lb.	.0380	.0554
400 Pine Tar* (600* & 800*) (t.c., dms.)	lb.	.0380	.0554
PX-104*	lb.	.30	.32½
PX-108*	lb.	.30½	.33
PX-138*	lb.	.32½	.33½
PX-208*	lb.	.44½	.45½
PX-238*	lb.	.44½	.45½
PX-404*	lb.	.66	.67
PX-438*	lb.	.60	.61
PX-800*	lb.	.34	.35
PX-917*	lb.	.36½	.37½
RC Plasticizer B-17* (dms.)	lb.	.23½	.24½
O-16* (dms.)	lb.	.30	.31
TG-8*&TG-9* (dms.)	lb.	.34½	.35½
TG-85* (dms.)	lb.	.36½	.37½
RC Polymeric BGA* (dms.)	lb.	.45½	.46½
Reogen*	lb.	.14¼	.14½
465 Resin* (dms.)	lb.	.07½	.08
Resin C*	lb.	.0225	.0310
Resinex*	lb.	.03¾	.05¼
L-4*	lb.	.02¼	.03¼
Rexflex*	lb.	—	.15
Rosin Oil	gal.	.80	1.35
RR-10 (Neoprene)*	lb.	—	.37
R.S.O. Softening Oil*	lb.	.03	.05
RuBars*	lb.	.19¼	.20
Rubberol*	lb.	.18	.25¾
Santicizer B-16*	lb.	.48¾	.49¾
E-15*	lb.	.54	.55
M-17*	lb.	.46	.47
No. 140*	lb.	.35	.36
No. 141*	lb.	.36	.37
No. 160*	lb.	.29	.30
No. 602*	lb.	—	.28½
No. 603*	lb.	—	.27
Sherolatum*	lb.	.03½	.06
Staflex DBES*	lb.	.58	.60½
DOS*	lb.	.58	.60½
IXA*	lb.	.32	.35
KA*	lb.	.36	.38¾
Stan Chlor Oils*	lb.	.13½	.20½
70*	lb.	.17½	.30
Stanolind Petrolatum*	lb.	.07	.156
Wax*	lb.	.31	.33
Sunny South Burgundy Pitch*	lb.	.1030	.1085
Rosin Oil*	gal.	.58	.76
Superla Wax*	lb.	.30	.397
Syncera Wax*	lb.	.16	.267
Syn Tac* (c.l.)	gal.	—	.33
Synthetic Revertant Oil	lb.	—	.16

Not JUST Straight . . .
but Stanford STRAIGHT!

Complete "Package" unit ready to install on any type web printing or processing equipment.

Stanford Model 110
Automatic
WEB GUIDE

Patent No. 2, 387, 036 ISSUED OCT. 1945

MAINTAINS ACCURATE SIDE OR INTERMEDIATE POINT REGISTER WITHIN PLUS OR MINUS .010 INCH!

WORLD'S MOST EFFICIENT, most economical side register control — now *better than ever* to help save time, money and material in every printing and converting plant. Unique Stanford vacuum principle *instantly corrects* any change in web path with maximum accuracy. Can save its cost many times over by preventing spoilage . . . eliminating re-winding . . . permitting full-speed operation.

Saves BIG MONEY on All Web-Fed Processes:

- Coating
- Laminating
- Calendering
- Tentering
- Printing
- Spreading

. . . EVERY MATERIAL

- Eliminates Telescoped and out-of-register rolls
- Handles any width
- Minimum maintenance--fewer moving parts
- Unconditionally guaranteed

Get the full "Stanford Story" on our 30-Day Test-Trial in your plant
Write, Wire, or Phone Today!

Stanford ENGINEERING COMPANY
SALEM, ILLINOIS - PHONE: SALEM 553
Canadian Reps: Manton Brothers, Ltd., Toronto
Mfrs. of Slitters, Web Guides, Rewinding and Constant Tension Equipment

The journal of the Rubber and Plastics Industries

Rubber Journal and International Plastics

Annual Subscription (including postage) to United Kingdom and overseas £2.15.0.

Annual subscription to United States $8.

Index half-yearly 10/—per annum extra.

Also publishers of the Rubber Trade Directory of Great Britain.

A comprehensive guide. $12.50 post free.

The only weekly journal in the world for the Rubber and Plastics Industries, it contains in a year more editorial matter than any other publication in its field. R.J.I.P. is read by administrative and other executives as well as by scientists and technologists throughout the world. Under its old title RUBBER JOURNAL, it has been the leading source of accurate information in the Rubber Industry for 74 years. R.J.I.P.'s world-wide news coverage and authoritative scientific and technical articles written by leading experts in the field provide a unique service which R.J.I.P. offers its world readership each week.

Specimen copy and advertising rates on application to the publishers.

Maclaren & Sons Ltd.
131 Great Suffolk Street London, S.E.1
Telegrams: Buns, Souphone, London Telephone: HOP 5712 (6 lines)

PLASTICIZERS & SOFTENERS (Cont'd)

Tar, Refined	gal.	.1200 -	.1760
Tarpine	lb.	.035 -	.050
Terpene A*	gal.	—— -	.65
Tetraflex R-122*	lb.	.27 -	.30½
TP-90B*	lb.	.59 -	.69
TP-95*	lb.	.65 -	.75
Transphalt Resins*	lb.	.03¾ -	.05¼
Tributyl Phosphate	lb.	.52½ -	.53½
Tricresyl Phosphate	lb.	.32½ -	.36
Turgum S*	lb.	.10¾ -	.11¾
Turgum SB*	lb.	.06¾ -	.07¾
Turpol NC-1200*	lb.	.67 -	.70
NC-1300*	lb.	—— -	.50
Vanadiset B*	lb.	.036 -	.07
C*	lb.	.031 -	.06
MR 80 Mesh*	lb.	.08½ -	.12½
Vistac No. 1*	gal.	1.00 -	1.21
P*	lb.	.18 -	.18½
Vopcolene 50*	lb.	—— -	.31
Witcizer 100*	lb.	.26 -	.27
200*	lb.	.22¼ -	.25¼
300*	lb.	.30 -	.33½
312*, 313*	lb.	.28 -	.31½
412*	lb.	.42½ -	.46

PROCESSING AIDS

Castor Oil, Blown (dms.)	lb.	.26½ -	.27½
Refined (dms.)	lb.	—— -	.18½
Castorwax*	lb.	.25 -	.31
Dutrex 7*	lb.	.12 -	.20
ELA*	lb.	—— -	.82
Hydrofol Glycerides 200*	lb.	.15½ -	.19¾
Kenflex N*	lb.	.19 -	.26
Maleic Anhydride	lb.	—— -	.27
Millrex*	lb.	—— -	.15
Nadic Anhydride	lb.	—— -	.75
Polycin*	lb.	—— -	.24½
Resin No. 510*	lb.	.19 -	.26
No. 529*	lb.	.25 -	.32
Pulverized*	lb.	.20½ -	.25
Thiomalic Acid	lb.	—— -	3.50
Zyrox*	lb.	.78 -	.88

PROTECTIVE & STABILIZING AGENTS

Acacia*	lb.	.12¾ -	.21
Alcogum*	lb.	.08½ -	.24
Alpha Protein	lb.	—— -	.23
Aroostoocrat*	lb.	—— -	.07½
Carob Bean Flour	lb.	—— -	.50
Casein	lb.	.22 -	.35
Emcol K-8300* (dms.)	lb.	.14 -	.18
Ethylene Diamine 68%	lb.	.44 -	.47
Gum Arabic	lb.	—— -	.23
Karaya Gum	lb.	—— -	.35
Locust Bean Gum	lb.	—— -	.50
Prosein*	lb.	—— -	.06
Stablex B*	lb.	.50 -	.95
K*	lb.	.27 -	.35

RECLAIMING AGENTS

Amalgamator Z-4*	lb.	.34 -	.35
Armeen C*	lb.	.46 -	.52
Mixed Crude*	lb.	.19 -	.25
T*	lb.	.32 -	.38
Burco RA*	lb	.05 -	.081
BWH-1*	gal.	.17 -	.18
C-6 Oil* (28° & 34°)	gal.	.33 -	.38
C-10 Oil*	gal.	.25 -	.30
C-33* (t.c.)	gal.	—— -	.21½
C-42* (t.c.)	gal.	—— -	.23
Caustic Soda—Flake 76% (c.l., dms.)	cwt.	—— -	4.50
Liquid 50% (t.c.)	cwt.	—— -	2.80
Solid 76% (c.l., dms.)	cwt.	—— -	4.10
Cresylic Acid (99-100%)	gal.	.85 -	1.39
D-4* (t.c.)	gal.	—— -	.27
E-5* (t.c.)	gal.	—— -	.25
Flake Calcium Chloride (77-80%)	ton	—— -	29.00
G.B. Reclaiming Oil*	gal.	.13½ -	.21½
CD-10*	gal.	.11½ -	.19½
CD-50-U*	gal.	.19½ -	.27½
Gensol No. 6* (t.c.)	gal.	—— -	.42
Heavy Aromatic Naphtha	gal.	.13¼ -	.18½
LX-77 Reclaiming Solvent*	gal.	.21 -	.33
LX-572 Reclaiming Oil*	gal.	.27 -	.32
LX-777 Reclaiming Oil*	gal.	.23 -	.33
Neo-Fat D-242*	lb.	.05½ -	.07¾
42-70*	lb.	.08¼ -	.10½
No. 517 H.B. Oil*	gal.	.11½ -	.16½
535*	gal.	.22 -	.27
Nucom* (t.c.)	gal.	—— -	.42
Pitt-Consol "500" (dms.)	lb.	.30 -	.30½
PT 101 Pine Tar Oil* (t.c., dms.)	lb.	.0380 -	.0554
Q Oil* (t.c.)	gal.	—— -	.286
Reclaiming Oil 3186-G*	gal.	.26 -	.33
Reclaiming Reagent No. 1431*	lb.	.21 -	.25
R.P.A. No. 3*	lb.	—— -	.51
RR-10*	lb.	—— -	.37
Soda Ash (c.l., bags)	cwt.	—— -	1.75
Solvent 534*	gal.	.20½ -	.26½
Solvent Oil 21*	gal.	.24 -	.29
C-42*	gal.	.23 -	.38
X-1 Resinous Oil*	lb.	.0225 -	.0325
701 Oil*	gal.	.27 -	.29

REINFORCING AGENTS—CARBON BLACK

Channel, Hard Processing (HPC) (bags)

Atlantic HPC-98*	lb.	.0775 -	.1450
Continental F*	lb.	.0775 -	.1450
Croflex*	lb.	.0775 -	.1450
Dixiedensed (and S)*	lb.	.0775 -	.1450
Kosmobile (and S)*	lb.	.0775 -	.1450
Micronex HPC*	lb.	.0775 -	.1450
Witco No. 6*	lb.	.0775 -	.1450

Channel, Medium Processing (MPC) (bags)

Arrow MPC*	lb.	.0775 -	.1350
Atlantic MPC-95*	lb.	.0775 -	.1450
Continental A*	lb.	.0775 -	.1450
Croflex TH*	lb.	.0775 -	.1450
Dixiedensed HR (and S-66)	lb.	.0775 -	.1450
Kosmobile HM (and S-66)	lb.	.0775 -	.1450
Micronex Standard*	lb.	.0775 -	.1450
Spheron 6*	lb.	.0775 -	.1450
Texas M*	lb.	.0775 -	.1450
Witco No. 1*	lb.	.0775 -	.1450

Channel, Easy Processing (EPC) (bags)

Atlantic EPC E-42*	lb.	.0775 -	.1450
Collocarb*	lb.	.0590 -	.1400
Continental AA*	lb.	.0775 -	.1450
Croflex 77*	lb.	.0775 -	.1450
Dixiedensed 77*	lb.	.0775 -	.1450
Kosmobile 77*	lb.	.0775 -	.1450
Micronex W-6*	lb.	.0775 -	.1450
Spheron 9*	lb.	.0775 -	.1450
Texas E*	lb.	.0775 -	.1450
Witco No. 12*	lb.	.0775 -	.1450
Wyex EPC*	lb.	.0775 -	.1350

Channel, Conductive (CC) (bags)

Continental R-40*	lb.	.2600 -	.3400
Dixie 5 Dustless*	lb.	.1350 -	.2100
Dixie Voltex*	lb.	.2600 -	.3400
Kosmink Dustless*	lb.	.1350 -	.2100
Kosmos Voltex*	lb.	.2600 -	.3400
Spheron C*	lb.	.1800 -	.2400
Voltex*	lb.	.2600 -	.3400

Conductive Furnace Black (CF) (bags)

Aromex CF*	lb.	.0875 -	.1450
Atlantic CF*	lb.	.0925 -	.1500
Continex CF*	lb.	.1050 -	.1550
Croflex CF*	lb.	.0925 -	.1500
Dixie CF*	lb.	.0925 -	.1500
Kosmos CF*	lb.	.0925 -	.1500
Shawinigan Acetylene Black*	lb.	—— -	.1900
Vulcan C*	lb.	.1100 -	.1750

Extra-Conductive Furnace Black (ECF) (bags)

Vulcan XC-72 (pellets)*	lb.	.2500 -	.3300

Furnace, Fast Extruding (FEF) (bags)

Arovel FEF*	lb.	.0675 -	.1250
Atlantic 125*	lb.	.0675 -	.1250
Continex FEF*	lb.	.0675 -	.1250
Croflex 50*	lb.	.0675 -	.1250
Dixie 50*	lb.	.0675 -	.1250
Kosmos 50*	lb.	.0675 -	.1250
Philblack A*	lb.	.0675 -	.1250
Statex M*	lb.	.0675 -	.1250
Sterling SO*	lb.	.0675 -	.1250

Furnace, Fine (FF) (bags)

Statex B*	lb.	.0725 -	.1300
Sterling 99*	lb.	.0725 -	.1300

Furnace, General Purpose (GPF) (bags)

Arogen GPF*	lb.	.0600 -	.1175
Atlantic 118*	lb.	.0600 -	.1175
Croflex 35*	lb.	.0600 -	.1175
Dixie 35*	lb.	.0600 -	.1175
Kosmos 35*	lb.	.0600 -	.1175
Statex G*	lb.	.0600 -	.1175
Sterling V*	lb.	.0600 -	.1175
V (Non-Staining)	lb.	.0600 -	.1175

Furnace, High Abrasion (HAF) (bags)

Aromex HAF*	lb.	.0775 -	.1350
Atlantic 130*	lb.	.0775 -	.1350
Continex HAF*	lb.	.0775 -	.1350
Croflex 60*	lb.	.0775 -	.1350
Dixie 60*	lb.	.0775 -	.1350
Kosmos 60*	lb.	.0775 -	.1350
Philblack O*	lb.	.0775 -	.1350
Statex R*	lb.	.0775 -	.1350
Vulcan 3*	lb.	.0775 -	.1350

REINFORCING AGENTS—CARBON BLACK (Cont'd)

Furnace, High Modulus (HMF) (bags)

Atlantic 120*	lb.	.0625 -	.1200
Continex HMF*	lb.	.0675 -	.1200
Croflex 40*	lb.	.0625 -	.1200
Dixie 40*	lb.	.0625 -	.1200
Kosmos 40*	lb.	.0625 -	.1200
Modulex HMF*	lb.	.0625 -	.1200
Statex 93*	lb.	.0625 -	.1200
Sterling L*	lb.	.0625 -	.1200
LL*	lb.	.0625 -	.1200

Furnace, Semi-Reinforcing (SRF) (bags)

Atlantic 115*	lb.	.0575 -	.1175
Continex SRF*	lb.	.0575 -	.1150
Croflex 20*	lb.	.0575 -	.1150
Dixie 20*	lb.	.0575 -	.1150
Essex SRF*	lb.	.0575 -	.1150
Furnex*	lb.	.0575 -	.1150
Gastex*	lb.	.0625 -	.1250
Kosmos 20*	lb.	.0575 -	.1150
Pelletex*	lb.	.0575 -	.1150
NS*	lb.	.0575 -	.1150
Shawinigan Acetylene Black*	lb.	—— -	.1900
Sterling NS*	lb.	.0575 -	.1150
R*	lb.	.0625 -	.1250
S*	lb.	.0575 -	.1150

Furnace Super Abrasion (SAF) (bags)

Atlantic 150*	lb.	.1150 -	.1650
Croflex 85*	lb.	.1150 -	.1650
Dixie 85	lb.	.1150 -	.1650
Kosmos 85	lb.	.1150 -	.1650
Philblack E*	lb.	.1150 -	.1725
Statex 160*	lb.	.1150 -	.1800
Vulcan 9*	lb.	.1150 -	.1800

Furnace, Super Abrasion, Intermediate (ISAF) (bags)

Aromex ISAF*	lb.	.0925 -	.1500
Atlantic 135*	lb.	.0925 -	.1500
Continex ISAF*	lb.	.0925 -	.1500
Croflex 70*	lb.	.0925 -	.1500
Dixie 70*	lb.	.0925 -	.1500
Kosmos 70*	lb.	.0925 -	.1500
Philblack I*	lb.	.0925 -	.1500
Statex 125*	lb.	.0925 -	.1500
Vulcan 6*	lb.	.0925 -	.1500

Furnace, Super Conductive (SCF) (bags)

Conductex SC*	lb.	.1150 -	.1800
Vulcan SC*	lb.	.1800 -	.2450

Thermal, Fine (FT) (bags)

P-33 (c.l.)*	lb.	—— -	.0575
Sterling FT (c.l.)*	lb.	—— -	.0575

Thermal, Medium (MT) (bags)

Shellblack*(†)	lb.	—— -	.0250
Sterling MT (c.l.)*	lb.	—— -	.0400
MT Non-Staining (c.l.)*	lb.	—— -	.0500
Thermax (c.l.)*	lb.	—— -	.0400
Stainless (c.l.)	lb.	——	.0500

REINFORCING AGENTS—SILICA

Cab-o-sil*	lb.	.67 -	.85
D. C. Silica (pelletized)*	lb.	1.45 -	1.65
Hi-Sil 233*	lb.	.08 -	.09½
X303*	lb.	.40 -	.45
Santocel*	lb.	.62 -	.64
Valron Estersil*	lb.	2.00 -	2.25

REINFORCING AGENTS—MISCELLANEOUS

Angelo Shellac*	lb.	.40 -	.50
Cato* (bags)	lb.	17.00 -	17.15
Darex Copolymer No. 3*	lb.	.47 -	.49
43G*	lb.	.39 -	.41
Darex Copolymer Latex No. 3-L	lb.	.41½ -	.46
Durez 12687 (and 12707)*	lb.	.36½ -	.40
Durez 13355*	lb.	.27½ -	.31½
Good-rite Resin 2007*	lb.	.36 -	.38
2057*	lb.	.30 -	.31
Hystron*	lb.	.39 -	.41
Kralac A-EP*	lb.	.39 -	.41
Lampblack	lb.	—— -	.12
Marbon S and S-1*	lb.	.36 -	.43
8000*	lb.	.36 -	.43
Marmix	lb.	.35 -	.43
Mistron Vapor*	ton	—— -	70.00
HGO-55*	ton	—— -	95.50
Pliolite Latex 150*	lb.	.35 -	.39
Pliolite Resin-Rubber Masterbatches*	lb.	.33 -	.57
Pliolite NR*	lb.	.93 -	.95
S6B*	lb.	.36 -	.43
Plio-Tuf G85C*	lb.	.52 -	.54
Polyco 220*	lb.	.18¼ -	.19¼
Polypol S-70*	lb.	.25 -	.26

Businesspaper advertising brings you information on new and better products, alerts you to new processes and production methods by which you can improve your own products. That's why it pays to read the advertising in your businesspaper. Helps you keep an ear to the ground for new and important developments you can put to work—profitably.

BETTER PRODUCTS
LOWER PRICES
MORE JOBS

Businesspaper advertising helps to lower prices of the products you buy and sell by broadening markets, building sales volume, bringing you cost-saving opportunities. When you're looking for ways to lower costs and prices . . . give better value . . . and improve profits, it's the editorial pages of your businesspapers that tell you *how* —and the advertising pages that tell you *with what.*

Businesspaper advertising helps create demand, improve products, step-up production, distribution and sales. With new companies, new factories, new products, new services constantly being developed, you get a healthy, vigorous economy—a full-employment economy. Yes, sir! Advertising works. And it works for you.

Advertising works for you!

Advertising Federation of America

Advertising Association of the West

Prepared for AFA and AAW by the Associated Business Publications in the interest of better understanding of businesspaper advertising.

RETARDERS

Benzoic Acid TBAO-2*	lb.	——	.44
Dutch Boy Normasal*	lb.	——	.46
ESEN*	lb.	.35	.37
Good-rite Vultrol*	lb.	.67	.70
Harcopol 1183*	lb.	.70	.74
Retarder J*	lb.	.62	.64
PD*	lb.	.39	.41
W*	lb.	——	.46
Retardex*	lb.	.46	.46
Wiltrol P	lb.	.39	.41

RUBBER SUBSTITUTES

Mineral Rubber

Byerlyte*	ton	50.00	57.00
Hard Hydrocarbon (dms.)*	ton	53.00	60.00
Herron Flake*	ton	——	45.00
Mineral Rubber, Solid	ton	42.50	44.50
M. R. No. 38*	ton	57.00	70.00

Vulcanized Vegetable Oils

Amberex*	lb.	.29	.36
Brown	lb.	.15	.24
Car-Bel-Lite*	lb.	——	.36
Neophax*	lb.	.17	.27
Polyrez A and C*	lb.	.12	.17
White	lb.	.15	.26
670 Brown	lb.	.14¼	.14¾

Miscellaneous Rubber Substitutes

G.B. Asphaltenes*	lb.	.06	.06½
Gilsowax B*	lb.	.09	.11
Resin No. 1098 (dms.)	lb.	——	.62
No. 1198*	lb.	.46¼	.49¾
Tysonite*	lb.	.26	.26¾

SOLVENTS

Acetone (dlvd.)	lb.	.11	.12½
Amsco Lactol Spirits* (t.c.)	gal.	——	.20
Naphthol Spirits*	gal.	——	.19
Mineral Spirits*	gal.	——	.18
Rubber Solvent* (t.c.)	gal.	——	.19
Solv A* (t.c.)	gal.	——	.22
Solv A-80* (t.c.)	gal.	——	.23½
Solv B* (t.c)	gal.	——	.28
Solv B-90* (t.c.)	gal.	——	.31
Solv D* (t.c.)	gal.	——	.30
Solv E*	gal.	——	.30
Solv F*	gal.	——	.30
Solv F-80*	gal.	——	.32
Solv G*	gal.	——	.36
Special Naphtholite* (t.c.)	gal.	——	.19
Special Textile Spirits*	gal.	——	.20
Super Hi-Flash Naphtha*	gal.	——	.34
Super Naphtholite*	gal.	——	.19
Textile Spirits* (t.c.)	gal.	——	.20
Amyl Chlorides, Mixed (t.c.l.) (dms.)	lb.	——	.11
Benzol 90%	gal.	.36	.40
Butyl Acetate	lb.	.17	.18
Butyl Alcohol	lb.	.17	.18
Secondary (dlvd.)	lb.	.15	.16½
Tertiary (dlvd.)	lb.	.15	.16½
Carbon Bisulfide, Tech.	lb.	.0545	.0161
Carbon Tetrachloride	lb.	.10¾	.14¼
Cosol 1*	gal.	.37	.43
2*	gal.	.42	.48
Cyclohexane	gal.	.77	110.00
85% (c.l.) (dms.)	gal.	——	.56
Cyclohexanone	lb.	.29	.31½
Diacetone, Pure (dlvd.)	lb.	.15½	.17
Dichlorethyl Ether (dms.)	lb.	.15½	.16½
Dichloropentanes (l.c.l.) (dms.)	lb.	——	.06
Dicom*	gal.	——	.55
Halowax Oil*	gal.	.28	.41
Heptanes* (t.c.)	gal.	.19	.22
Hexanes (t.c.)	gal.	.19	.22
Isopropyl Alcohol, Ref. 99% (dlvd.)	gal.	.62	.72
Ether, Ref. (dlvd.)	lb.	.09½	.11
Mersol*	gal.	.43	.75
Mesityl Oxide (dlvd.)	lb.	.15	.16½
Methyl Acetone, Syn. (dms., dlvd.)	gal.	.66	.72
Methyl Chloride	lb.	——	.12¾
Methyl Ethyl Ketone	lb.	.15	.16½
Methyl Isobutyl Ketone (dlvd.)	lb.	.17	.18½
Methylene Chloride	lb.	——	.12½
N-5 Pentane Mix* (t.c.)	gal.	——	.13½
N-6 Hexanes* (t.c.)	gal.	——	.14½
N-7 Hexanes* (t.c.)	gal.	——	.13½
Penetrell*	gal.	.42	.63
Perchlorethylene	lb.	——	.11
Petrolene* (t.c.)	gal.	——	.14125
Picolines, Alpha, Refined	lb.	.43½	.44
Mixed	lb.	.32½	.33
Proprietary Solvent (dms.)	gal.	.66	.77
Propyl Acetate (t.c., dlvd.)	lb.	——	.11¾
Alcohol (t.c., dlvd.)	lb.	——	.11
Pyridine, Refined	lb.	.74½	.75
Quinoline	lb.	.50	.54¼
Rubber Solvent (t.c.)	gal.	——	.16
Rubsol (t.c.)	gal.	——	.12875
Skellysolve B (Hexanes)* (t.c.)	gal.	——	.158
C (Heptanes)* (t.c.)	gal.	——	.151
R (Rubber Solvent)*	gal.	——	1.29
Solvent, Crude, Light	gal.	.19	.28
Solvesso 100* (t.c.)	gal.	.33	.35
150 (t.c.)	gal.	.33	——
Sunny South DD Dipentine*	gal.	.42	.63
Sunny South DD Pine Oil*	lb.	——	.15
Sunray*	gal.	.1140	.1600
Toluene (dms.)	gal.	——	.38
Toluol (t.c.)	gal.	.33	.35
Trichlorethane	lb.	——	.12¾
Triglycol Dichloride	lb.	.63	.64
Union Thinner 1* (t.c.)	gal.	——	.174
5* (dms.)	gal.	——	.199
7* (t.c.)	gal.	——	.164
2-50 W Hi-Flash*	gal.	——	.41
Xylol	gal.	.34	.38

STABILIZING AGENTS (for Vinyl Resins)

Advastab BC-12*	lb.	.90	.95
BC-74*	lb.	.70	.75
BC-105*	lb.	.75	.80
CH-101*	lb.	.60	.65
CH-201*	lb.	.60	.65
E-82*	lb.	.90	.95
JCX*	lb.	.62	.67
L Paste*	lb.	.65	.70
SN*	lb.	.47	.52
T-10*	lb.	1.90	1.95
T-50-LT*	lb.	3.20	3.25
XBZ-155*	lb.	.69	.74
XC-143*	lb.	.90	.95
XE-98*	lb.	.53	.58
Amioca 50* 85* (bags)	lb.	11.11	11.26
Barca 10*	lb.	.75	.80
Barium Ricinoleate (BVS)	lb.	——	.70
Barium Stearate	lb.	.41	.46
Basic Silicate White Lead	lb.	.16	.17
Cadmium Ricinoleate	lb.	——	2.00
Calcium Ricinoleate	lb.	——	.55
Dutch Boy DS-207*	lb.	——	.54
Plumb-O-Sil A*	lb.	——	.29¾
B*	lb.	——	.31¾
Tribase*	lb.	——	.26½
Dythal*	lb.	——	.39½
Ferro 182* (dms.)	lb.	.70	.76
200* (dms.)	lb.	1.33	1.43
203* (dms.)	lb.	.87	.91
541* (dms.)	lb.	.35½	.45½
541A* (dms.)	lb.	.82	.86
700* (dms.)	lb.	.48¾	.58¾
900* (dms.)	lb.	.90	.94
903* (dms.)	lb.	.60	.64
909* (dms.)	lb.	.91	.95
920*	lb.	——	.98
931* (dms.)	lb.	.75¾	.85¾
993* (dms.)	lb.	.89	.99
1203* (dms.)	lb.	1.30	1.40
1206* (dms.)	lb.	1.32	1.36
1820* (dms.)	lb.	.90	.94
1825* (dms.)	lb.	1.00	1.04
1976*	lb.	.47	.51
Harshaw 1-V-3*	lb.	.43	.45
1-V-4*	lb.	.66½	.70
1-V-7*	lb.	.70	.72
2-V-4*	lb.	.85	.87
2-V-7*	lb.	——	1.10
2-V-8*	lb.	——	1.30
5-V-1*	lb.	.41	.43
7-V-1*	lb.	——	.90
8-V-1*	lb.	.88	.90
8-V-5*	lb.	——	.80
8-V-100*	lb.	.82	.84
9-V-1*	lb.	.70	.72
12-V-5*	lb.	73	.75
24-V-1*	lb.	1.10	1.12
28-V-2*	lb.	——	1.18
128-V-5*	lb.	.86	.88
Kosol* (bags)	lb.	19.00	19.50
Lithium Stearate	lb.	.52	.57
Fluffy	lb.	.47½	.70
Standard	lb.	.52½	.75
Mark A*	lb.	2.80	3.15
C*	lb.	.81	.84
E*	lb.	.72	.75
GS*	lb.	.77	.80
M*	lb.	.59	.62
PL*	lb.	.62	.65
TT*	lb.	.72	.75
WS*	lb.	.97	1.00
X*	lb.	2.50	2.75
XT*	lb.	.87	.90
XV*	lb.	.84	.87
XX*	lb.	.57	.60
Metasap 613-A*	lb.	——	.69
613-B*	lb.	——	.84
613-C*	lb.	——	1.06
621*	lb.	——	.88
624*	lb.	——	.75
633*	lb.	——	.75
635*	lb.	——	.45
Modicol N*	lb.	.42½	.44½
S*	lb.	.30⅞	.32⅞
Sodium Silicates 41°/1:32	cwt.	1.20	2.30
Stabelan E*	lb.	1.40	1.50
XL*	lb.	.55	.65
HR-50*	lb.	.75	.90
HR Liquid*	lb.	.65	.75
HR Paste*	lb.	.85	.95
HR Powder*	lb.	.95	1.05

STABILIZING AGENTS (Cont'd)

No. 110 Liquid	lb.	.65	.75
Istabelan No. 115 Liquid	lb.	.85	.95
No. 120 Liquid	lb.	.65	.75
Stabilizer No. 52*	lb.	1.90	2.00
89X*	lb.	.75	.80
B-5*	lb.	——	.70
E6B*	lb.	——	.95
G-1*	lb.	1.25	1.40
HR*	lb.	.85	.89
L*	lb.	——	.60
OM-10*	lb.	——	1.95
Staflex OY*	lb.	1.00	1.20
QXMA*	lb.	——	.70
Stayrite 10*	lb.	.36	.41
P-10*	lb.	.43	.45
15*	lb.	.55	.57
20*	lb.	.41	.46
22*	lb.	1.00	1.13
25*	lb.	.35	.40
70*	lb.	.70	.72
71*	lb.	.90	.92
75*	lb.	.61	.63
76*	lb.	.53	.55
80*	lb.	.70	.72
90*	lb.	.70	.72
95*	lb.	.70	.72
229*	lb.	.61	.63
Vanstay A* (dms.)	lb.	.50	.53
AB* (dms.)	lb.	.46	.49
CE* (dms.)	lb.	.44	.47
HT* (dms.)	lb.	.87	.90
HTA* (dms.)	lb.	.97	1.00
HTB* (dms.)	lb.	.70	.73
HTC* (dms.)	lb.	1.09	1.12
L* (dms.)	lb.	.32	.35
R* (dms.)	lb.	.67	.70
RZ-25* (dms.)	lb.	.65	.69
S* (dms.)	lb.	.57	.60
SA* (dms.)	lb.	.81	.84
W* (dms.)	lb.	1.22	1.25
X* (dms.)	lb.	.67	.70
Z* (dms.)	lb.	.62	.65

STIFFENING AGENTS

Polyac*	lb.	——	1.85
Processing Stiffener 710*	lb.	——	.88
Solvitose HDF, H. C-S, T, and E*	lb.	.22	.25
Versatil Gum 8-E*	lb.	.15	.19

SUN CHECKING AGENTS

Allied AA-1144*	lb.	.23	.24
AA-1177*	lb.	.15½	.16½
Antisol*	lb.	——	.23
Antisun* (Chipped)	lb.	.15½	.17½
(Slabbed)	lb.	.15	.17
Heliozone*	lb.	.31	.32
Microflake*	lb.	.20	.24
Nacconol NRSF*	lb.	.40½	.45
NBC*	lb.	——	1.67
Ross Sunproofing Waxes*	lb.	——	.15
Sunolite*	lb.	.16	.22
127*	lb.	.16½	.20½
154*	lb.	.23	.25
Sunproof*	lb.	.31	.32
713*	lb.	.25	.26
Improved*	lb.	.25	.26
Super*	lb.	.40	.41
Jr.*	lb.	.20	.21
Tonox*	lb.	.52	.54

SURFACE ACTIVE AGENTS

Anhydrapent*	lb.	.56	.59
Anhydrol 6990*	lb.	.51	.56
6991*	lb.	.51	.56
Aquarex D*	lb.	——	.78
C*	lb.	——	.21
MDL*	lb.	——	.33
ME*	lb.	——	.80
NS*	lb.	——	.60
SMO*	lb.	——	.50
WAQ*	lb.	——	.20
Emulphor EL-620*	lb.	——	.40
EL-719*	lb.	——	.58
ON-870*	lb.	——	.55
Hyonics*	lb.	——	.28¾
Igepal CA-630	lb.	——	.29
CO-630	lb.	——	.29
CO-730	lb.	——	.29
CO-850*	lb.	——	.29
CO-880*	lb.	——	.29
Igepon CN-42*	lb.	——	.25
T-33*	lb.	——	.21
T-51*	lb.	——	.13½
T-77*	lb.	——	.49
Kessco 50201*	lb.	——	.44½
50203*	lb.	——	.44¼
18201*	lb.	——	.32
18203*	lb.	——	.35½
Lipal 9-N,* 11-0*	lb.	.28	.29
8-0,* 6-0*	lb.	.29	.30
25C,* 52C*	lb.	.34	.35
15T*	lb.	.23	.24
Pluronic L62*	lb.	.33½	.39
L64*	lb.	.33½	.39
Sellogen Gel*	lb.	——	.12¾
Soybean Lecithin	lb.	.13	.17
Synatol AV-60*	lb.	.28	.29

TACKIFIERS

Amalgamator Z-4*	lb.	.34	.35
Arreco 620-32B*	lb.	.20½	.21½
716-30*	lb.	.18½	.19½
1041-21*	lb.	.16½	.17½

TACKIFIERS (Cont'd)

Arcco A-26*	lb.	.18	.19
Bunaweld Polymer No. 780*	lb.	—	.24
No. 5514*	lb.	—	.35
Galex* (dms.)	lb.	.16	.18¾
Indopol H-300*	gal.	1.00	1.22
Koresin*	lb.	—	.95
Liquid Rubber Flux*	lb.	—	.14
Nacconal NRSF* (dlvd.)	lb.	.40½	.45
Nilox Resin* (c.l.)	cwt.	—	16.00
PR-162 Resin Emulsion	lb.	.82	—
Resin V	lb.	—	.23½
Synthol*	lb.	.17	.24¾
Vistac A*	lb.	.21½	.22¼
Vistanex LM Grades*	lb.	—	.45
Zirex* (c.l.)	cwt.	—	15.25

THICKENERS (For Latex)

Alcogum AN-6*	lb.	.06	.06½
AN-10*	lb.	.09	.10
AN-25*	lb.	—	.31
PA-15*	lb.	—	.16
Betanol* (dms.)	lb.	.70	.95
CM Starch* (bags)	lb.	26.85	27.00
Gomme Labolene*	lb.	.45	.47
Good-rite K-702*	lb.	.28½	.37
K-704*	lb.	.21	.22
K-705*	lb.	.30	.39
K-707*	lb.	.18	.19
K-708*	lb.	.28	.37
K-710*	lb.	.15	.16
Hycryl A-1000* (t.l.)	lb.	.090	.100
A-2000* (t.l.)	lb.	.335	.360
Hydroseal 3* (bags)	lb.	9.19	9.34
Melojel* (bags)	lb.	6.71	6.86
Modicol VD*	lb.	.13⅜	.14⅜
VE*	lb.	.13⅜	.14⅜
Polyco 296 BT*	lb.	.15	.16
296-N*; 530*	lb.	.15	.16
Propylene Laurate (dms.)	lb.	.57	.82
Sodium Silicate, 41°/1:3.2	cwt.	1.20	2.30
Solvitose Series*	lb.	.22	.25

VULCANIZING AGENTS

Peroxide

Di-cup	lb.	1.10	....
UC XK-1960*	lb.	5.50	—

Selenium

Vandex*	lb.	—	7.00
VA-7*	lb.	—	.50

Sulfur

Blackbird* (c.l.)	cwt.	—	2.85
Cloud* (c.l.)	cwt.	—	2.80
Crystex*	lb.	.19½	.23
Darex Dispersed Sulfur*	lb.	.14	.16

VULCANIZING AGENTS (Cont'd)

Devil A* (c.l.)	cwt.	—	2.40
Dispersed Sulfur	lb.	.14	.16
Insoluble Sulfur 60*	lb.	.12½	.13
Ko-Blend IS*	lb.	—	.39
Mist* (Wettable) (c.l.)	cwt.	—	4.00
Spider* (c.l.)	cwt.	—	2.80
Star* (c.l.)	cwt.	—	3.25
Sulfasan R*	lb.	1.55	1.57
Tire* (c.l.)	cwt.	—	2.55
Tube* (c.l.)	cwt.	—	4.40
Vultac 2*	lb.	.47	.49
3*	lb.	.51	.53

Tellurium

Telloy*	lb.	—	2.65

WETTING AGENTS

Advawet No. 10*	lb.	—	.17
No. 33*	lb.	—	.48
Aerosol 18*	lb.	.37	.42
AY*	lb.	.75	.80
MA 80%*	lb.	.40	.45
OT 75% Aqueous*	lb.	.40	.45
OT 100%*	lb.	.75	.80
OT-B*	lb.	.65	.70
Alrosol* (dms.)	lb.	.35	.41
Alrosperse*	lb.	—	.18
Anhydrol 6990* and 6991*	lb.	.51	.56
Areskap 50*	lb.	.30	.32
Dry 100*	lb.	.60	.64
Aresket Dry 300*	lb.	.60	.64
Aresklene 375*	lb.	.42	.47
Armacs*	lb.	.28	.77
Arquads*	lb.	.42	.61
Emcol 5100* (dms.)	lb.	—	.31
Energetic W-100	lb.	.28½	.35
Etho-Chemicals*	lb.	.26	.58
Ethomeen S/15*	lb.	.48	.50
T/15*	lb.	.46	.48
Kessco E-122* (dms.)	lb.	—	.45
18201*	lb.	—	.32
Kreelon 4D* (dms.)	lb.	.13	.16
8G* (dms.)	lb.	.26	.28
Kyro EO* (dms.)	lb.	—	.29¾
Modicol N*	lb.	.42½	.44½
S*	lb.	.30⅞	.32⅞
Nacconol SL* (dlvd.)	lb.	.084	.10
60S* (dlvd.)	lb.	.19	.225
Nacconol A* (dlvd.)	lb.	—	.52
Nekal WS-25	lb.	—	.38
WS-99	lb.	—	.95
Orvus AB Granules*	lb.	.16¼	.17¾
Parnol*	lb.	—	.13½
Regal Beads	lb.	.12¼	.16¾
H. D. Beads	lb.	.12¾	.15¾
Santomerse No. 3	lb.	.41	.45
S*	lb.	1.55	1.65

WETTING AGENTS (Cont'd)

Sorapon SF-73*	lb.	—	.18
SF-78*	lb.	—	.30
Sorbit P*	lb.	—	.28
Soybean Lecithin	lb.	.13	.17
Stablex G*	lb.	.50	.90
Tergitol 4* (dms., dlvd.)	lb.	.36½	.37½
7* (dms., dlvd.)	lb.	.43½	.44½
O8* (dms., dlvd.)	lb.	.36½	.37½
P28* (dms., dlvd.)	lb.	.18½	.19
Trenamine W-30	lb.	—	.15
Vultamol*	lb.	—	.17½
Wetsit Conc.*	lb.	.35	.35

MISCELLANEOUS CHEMICALS

Aquesperse 30*	lb.	—	.11
Arccopel W-18*	lb.	.17	.19
Black-Out Black, Clear & White	gal.	4.50	8.00
Chiplac Plaint	gal.	1.15	5.00
Copper Inhibitor No. 65*	lb.	—	1.57
D-Tac*	lb.	—	.22
2-Ethyl Hexanol	lb.	.23¾	.24¼
Fura-Tone Resin 1226*	lb.	.41	.43
MODX*	lb.	.38	.40
Nacconates* (dms.)	lb.	.99	3.53
Para Resins*	lb.	.04	.04½
Pigmented Filmite* (dlvd.)	lb.	.16¾	—
Resorcin, Tech.	lb.	.77½	.81½
Rio Resin*	lb.	.70	.72
Rongalite CX*	lb.	—	.21½
Sherosopes*	lb.	.13½	.18¾
Sublac Resin PX-5*	lb.	.23½	.24½
Synpep*	lb.	.54	.60
Thiokol LP-205*	lb.	—	4.00
Tysonite*	lb.	.30	.30¾
Vanfre*	gal.	2.45	3.00
No. 3* & No. 4*	gal.	1.95	2.00

SUPPLIERS

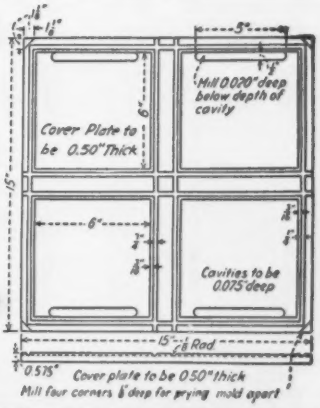
Are Your Materials Listed in the Market Prices Section? Forward full Information to Market Editor

HOGGSON TOOLS, MOLDS, DIES

For Rubber Testing and Production

"DUMBELL" Test Strip Die D412(SIT)

For making tensile test samples, we make many types of slab molds. One is detailed at the right. These are plain or chrome finished. We usually stock molds for making adhesion, abrasion, flexing, compression and rebound test samples, but supply special molds promptly. We also furnish hand-forged tensile dies for cutting regular or tear test samples.


SLAB MOLD DIS-55
Mill 0.020" deep below depth of cavity
Cover Plate to be 0.50" Thick
Cavities to be 0.075" deep
Cover plate to be 0.50" thick
Mill four corners ⅛ deep for prying mold apart

HOGGSON & PETTIS MFG. CO., 141A Brewery St., New Haven 7, Conn.

Pac. Coast: H. M. Royal, Inc., Downey, Calif.

KAUTSCHUK UND GUMMI

Official Journal of the German Society of Rubber Chemists and Technologists (Deutsche Kautschuk-Gesellschaft e.V.) The most quoted and authoritative German Rubber Journal.

KAUTSCHUK UND GUMMI promotes international exchange of ideas concerning economic, technical and scientific problems involved in the different phases of the manufacture of rubber and asbestos products. Business experts and authorities in science and technology supply facts, opinions and research results. Reports, and information from the industry's various associations are included.

KAUTSCHUK UND GUMMI is an excellent advertising medium which speaks to just those firms in the import and export trade to whom you want to speak. Specimen copy and advertising rates on application to the publishers.

KAUTSCHUK UND GUMMI

Berlin - Borsigwalde • Frankfurt am Main

REVUE GÉNÉRAL DU CAOUTCHOUC

International Publication on Rubbers and Plastics

42 rue Scheffer, Paris 16, France

An international journal covering the production, manufacturing and commerce of rubber and plastics. Founded in 1924. Texts in French, English, German, Spanish and Italian.

Each issue contains technical, scientific, agricultural and economic information and reports which are indispensable to your profession.

Annual Subscription: 4,000 frs.
Single Copies: 450 frs.

Sample Copy on Request

CLASSIFIED WANT ADS

RATES:

All Classifications (except Positions Wanted):
20c per word in light face type—Minimum, $7.50
25c per word in bold face type—Minimum, $7.50

Positions Wanted: (Light face type only)
$1.00 for 20 words or less; extra words, 5c each.

When Box Number is used, add 5 words to word count

Heading on separate line, $2.00 in light face; $2.50 in bold face.

Advertisements in borders: Available in display units (multiples of ☆ page) at display rates.

All Classified Advertising must be paid in advance except for advertisers on contract. Send check with copy

Replies to keyed advertisements will be forwarded to advertiser without charge.

Address all replies to Box Numbers care of RUBBER AGE, 101 West 31st St., New York 1, N. Y.

Copy for May, 1959, issue must be received by Friday, April 24.

POSITIONS WANTED

CHEMICAL & ENGINEERING TECHNOLOGIST—Many years experience in rubber, plastics and latex technology. Extensive pressure sensitive development and manufacturing experience. Solved many problems in coating, calendering and molding processes. Have been in consulting work, development and production in other chemical and technical fields. Numerous patents registered. B.S. Chem. with Ph.D. experience level. Mature age, presently employed. Consider new permanent connection or consulting engagements. New Jersey area preferred. Address Box R-351-P, RUBBER AGE.

GENERAL FOREMAN—15 years experience in molded goods, seeks opportunity with medium-sized, progressive firm. Familiar with all phases of operations on automotive mechanicals, shoe soling, tubing, matting, etc. Consistent record of low departmental costs. Desires to relocate. Address Box R-355-P, RUBBER AGE.

PRODUCTION MANAGER—Extensive background in all phases of latex dipped products. Some experience in plaster molding—working with natural and precured compounds. Desires responsible position with progressive organization. South or Far West preferred, but will relocate anywhere. Address Box R-359-P, RUBBER AGE.

QUALITY CONTROL MANAGER with experience in the latest techniques of statistical quality control and plant management desires position with well established firm in the Mechanical Molded Goods field. College background, 32 years old. If your inspection costs are eating up your profits perhaps you need a new approach. Address Box R-362-P, RUBBER AGE.

ASSISTANT RESEARCH DIRECTOR of large rubber company. Ph.D., 15 years in rubber industry. Varied experience in tires, belts, urethane foam, latex foam. Thorough knowledge of research, production and administration. Address Box R-363-P, RUBBER AGE.

CHEMIST—Eight years experience in rubber and plastics constituting formulation, research, product development and chemical sales. Seeks responsible position in midwest rubber plant or as technical representative servicing rubber, plastics, tape and adhesives. Please reply with job description. Address Box R-366-P, RUBBER AGE.

DEVELOPMENT ENGINEER—Extensive experience in molded goods processing, product design and development. 15 years diversified background all phases of plant production, tooling and equipment design with emphasis on cost reduction. Seeks responsible and challenging opportunity. Address Box R-367-P, RUBBER AGE.

EXECUTIVE POSITION desired, line or staff, by Industrial Engineer-Chemist who has had extensive experience in all phases of rubber and plastics. Possesses many years of management, production, engineering and development experience. Administrative talents are coupled with both practical and theoretical knowledge. Advanced degrees. Age 45. Will relocate anywhere, but south preferred. Address Box R-368-P, RUBBER AGE.

HELP WANTED

INVESTIGATE SUNNY SOUTH CAROLINA

1. Research Director—rubber and resin chemist, Ph.D. or equivalent. 2. Consultants in rubber and resin chemistry. 3. Mechanical Engineers with rubber plant engineering, design and maintenance background. 4. Patent Lawyer with rubber or resin experience. Send resumé today. CONTINENTAL TAPES, Cayce, South Carolina.

CHEMIST or CHEMICAL ENGINEER: Diversified factory — 100 employees—needs thoroughly experienced man to assume responsibilities for control and development of mechanical and extrusion divisions. Permanent position with opportunity for advancement. Salary commensurate with experience. Send resumé. Reply confidential. Address Box R-353-W, RUBBER AGE.

VINYL CHEMIST

Leading flooring manufacturer wants man with experience in calendering vinyl film or sheeting. Excellent opportunity in development and production. Salary commensurate with experience. Replies confidential. AMERICAN BILTRITE RUBBER CO., Trenton 2, N. J. Attn: Technical Director.

RUBBER PLANT MANAGER

Wonderful opportunity in Los Angeles, California. Must be thoroughly experienced and able to assume responsibility and supervision of rubber plant employing 100. Salary no object for right person. Send complete resumé and photo in first letter. Address Box R-357-W, RUBBER AGE.

HELP WANTED—Continued

LATEX CHEMIST

Mid-west concern looking for man with good general background in latex compounding and applications for development laboratory. Interested in man with 5-8 years in latex field. Good opportunity for the right man. Address Box R-358-W, RUBBER AGE.

SALES REPRESENTATIVE—Age 30-50 with sales and engineering background in molded rubber goods. Willing to travel midwestern, eastern and southern states continually. Will pay salary, commissions and expense allowance. Give complete details, references, etc., and enclose current snapshot. Address Box R-364-W, RUBBER AGE.

RUBBER CHEMIST

Excellent opportunity for rubber chemist with at least five years experience in compounding, processing and applications of elastomers. Growing company is expanding technical service activities. Located in choice residential area in Northern New Jersey. Submit resumé and salary requirements with first letter. Replies held in strict confidence.

Address Box R-369-W, RUBBER AGE

JUNIOR CHEMISTS

RESEARCH and DEVELOPMENT TRAINEES

Expanding company seeking chemists or chemical engineers for work in synthetic elastomers and polymers. 1959 graduates or up to two years experience. Parsippany-Troy Hills area in northern New Jersey. Interviews arranged after receipt of resumé.

Address Box R-370-W, RUBBER AGE

CHEMISTS — CHEMICAL ENGINEERS
ADMINISTRATIVE — TECHNICAL
Our National, Confidential Service
invites your investigation!
TOP CHEMICAL POSITIONS AT ALL LEVELS.
Call, write, or wire:—GLADYS HUNTING (Consultant)
DRAKE PERSONNEL, INC.
29 East Madison Building, Chicago 2, Ill.
FInancial 6-8700

"Help Wanted" continued on next page

WANTED

for Technical Sales

BY A LARGE MANUFACTURER OF SYNTHETIC RUBBER

A man with technical background preferably with compounding and processing experience in the rubber industry to handle sales and technical service position on Eastern seaboard. Excellent prospects for advancement.

Apply Box R-356-W, RUBBER AGE

PERSONNEL CONSULTANT
specialized in rubber & component materials
Production—Sales—Chemists—Engineers
—Technical Representatives—Marketing—
Product Development—Process Supervisors
Discuss your problems with
Clem D. Easly, Special Consultant
CADILLAC ASSOCIATES, INC.
220 S. State St., Chicago 4, Ill., WA 2-4800
Call, write or wire—in confidence

EXECUTIVE TECHNICAL SALES OFFICE

Nelson EMPLOYMENT SERVICE
specialist for the "Rubber Industry"
HAROLD NELSON — PHONE: FRANKLIN 6-6861
883 FIRST NATIONAL TOWER — AKRON 8, OHIO

EQUIPMENT WANTED

WANTED—Used No. 9 Banbury with or without 60" Slab Mill. State condition, age, voltage, where located and cash price. Address Box R-354-E, RUBBER AGE.

TENSILE AND COMPRESSION TESTER WANTED
Dillon Universal preferred. Address Box R-361-E, RUBBER AGE.

SOFTENERS & PLASTICIZERS FOR RUBBER

FROM THE PINE TREE

ROSIN OILS • PINE TAR
BURGUNDY PITCH
GALEX – a non-oxidizing ROSIN

Write for our "Pine Tree Products" and "Galex" Brochures **Dept. 35**
NATIONAL ROSIN OIL PRODUCTS, INC.
Pioneers of the Industry
The Americas Building • Rockefeller Center • New York 20, N. Y.
Exley Avenue, Savannah, Ga.

HOWE MACHINERY CO., INC.
30 Gregory Avenue, Passaic, N. J.
DESIGNERS & BUILDERS
OF "V" BELT MANUFACTURING EQUIPMENT
Cord Latexing, expanding mandrels, automatic cutting, skiving, flipping and roll drive wrapping machines
ENGINEERING FACILITIES FOR SPECIAL EQUIPMENT
Call or Write

---

50 YEARS
of Producing

*** MICA**
WATERGROUND
WHITE and BIOTITE

PURELY A DOMESTIC PRODUCT

Lowest priced . . . from our own larger source.

A more uniform Mica . . . preferred in the Rubber Industry for many years.

The English Mica Co.
STERLING BUILDING — STAMFORD CONN.

A CHALLENGE WITH A FUTURE

With Growing Manufacturer of Plastic & Rubber Resins.
Immediate Openings For

ADHESIVE CHEMIST

Young man with some background in adhesive development and evaluation, particularly in adhesives based on synthetic elastomers and resins, rather than natural gums, caseins, etc. Work will involve primarily rubber-to-metal adhesives. Prefer someone with 1-3 years experience and a B.S. in Chemistry or Chemical Engineering.

RUBBER COMPOUNDER

Young man with one or two years experience in compounding of organic reinforcing agents for elastomers. Will work in Development and Research areas of rubber compounding. Prefer a B.S. in Chemistry.

For both of the above, a lot of experience is not essential. What is of primary importance is a little experience with imagination, originality, and ability to carry through on projects.

Our company has over 25 years experience in the manufacture of synthetic resins for the plastic, paint, and rubber markets. We offer opportunities for personal growth. Interview and moving expenses paid.

Send personal data, including desired salary, to:

E. M. Mills
Personnel Director
MARBON CHEMICAL
Division of Borg-Warner
P. O. Box 68
Washington, West Virginia

Directory of CONSULTANTS

R. R. OLIN LABORATORIES, INC.
(Established 1927)
Consultation—Development—Research for rubber and plastics industries and for raw materials suppliers for same.
P. O. Box 372RA — Akron (9), Ohio Tel HEmlock 4-3724

SOUTH FLORIDA TEST SERVICE, INC.
(Established 1931)
Corrosion, weathering and sunlight tests. Four locations in Southern Florida for inland, salt atmospheric, tidewater and total immersion exposure tests.
4301 N. W. 7th St., Miami 44, Florida

PHILIP TUCKER GIDLEY
Consulting technologist—Research, product development, formulas, factory plans, engineering, chemical and physical testing.
Fairhaven, Massachusetts

HALE AND KULLGREN, INC.
Specialists in Process and Plants for Rubber and Plastics
A Complete Engineering Service including: Economic Surveys; Process Design; Installation; Contracting and Operation.
613 E. Tallmadge Ave., Akron 10, Ohio
FRanklin 6-7161

PELMOR LABORATORIES INC.
RESEARCH - DEVELOPMENT - PROCESSING

Hard and Soft Rubber and Plastics
Compounding and Formulation • Testing
Processing and Methods • Development Projects
Lab Planning and Organization • Molds, Mold Design
Engineering and Consulting Services.
Write: Coleman P. Morgan, President
401 Lafayette St. Newtown, Penna. WOrth 8-3334

MIXING TO SPECIFICATIONS
Also, lathe-cut, molded and extruded goods to specifications. Economical producers of quality soft rubber parts.
MARTIN RUBBER COMPANY, INC.
Long Branch, New Jersey

MIXING
To Your Specification
K. B. C. INDUSTRIES, INC. NEW HAVEN, CONN.
881 State St. Tel: State 7-5662
Otto J. Lang, General Manager

BLACK
Master Batching
Mixing of all kinds
BESTREAD PRODUCTS CO. STOUGHTON, MASS.

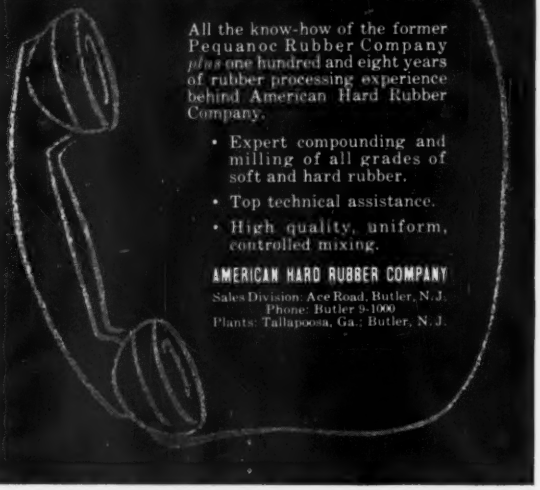
BUSINESS OPPORTUNITIES

SALE OR LEASE
Complete rubber plant for molded, extruded and lathe-cut goods. Approximately 40,000 feet; near New York City. Banbury, 4 mills, 20 presses, 3 extruders and all types of trimming equipment. Good labor market.
Address Box R-352-B, RUBBER AGE

WANTED TO BUY
Going rubber extrusion operation with modern machinery, equipment, inventory and customers.
Address Box R-360-B, RUBBER AGE

Surplus!
WANTED
Chemicals and Raw Materials
colors, plastics, resins, solvents, "Discontinued Formulations" etc.
Wire or phone for immediate action
ALL CHEMICALS CO.
37 EAST 28 ST.
N. Y. 16, N. Y. Lexington 2-8571

FOR PEQUANOC
CUSTOM COMPOUNDS
CALL
AMERICAN HARD RUBBER



All the know-how of the former Pequanoc Rubber Company *plus* one hundred and eight years of rubber processing experience behind American Hard Rubber Company.

- Expert compounding and milling of all grades of soft and hard rubber.
- Top technical assistance.
- High quality, uniform, controlled mixing.

AMERICAN HARD RUBBER COMPANY
Sales Division: Ace Road, Butler, N.J.
Phone: Butler 9-1000
Plants: Tallapoosa, Ga.; Butler, N.J.

EQUIPMENT FOR SALE

M-14 OAKES MIXING MACHINE for foam rubber. Perfect condition. Address Box R-350-S, RUBBER AGE.

FIRST CLASS EQUIPMENT from your FIRST Source. 2-roll mills—30", 42", 60". Heavy duty jacketed mixers double arm—Baker-Perkins in all sizes Lab. to 300 gal. Double ribbon blenders all sizes. Tumbling cone mixers to 300 cu. ft. Rotary cutters, plastics-rubber. National Erie 6" x 66" extruder. Preform presses by Stokes, Colton, Kux. Inquire about the FMC Rental-Purchase Plan—equipment pays for itself. FIRST MACHINERY CORP., 209-289 Tenth St., Brooklyn 15, N. Y. STerling 8-4672.

FOR SALE: 43 — Baker-Perkins #17, 200 gal. jacketed mixers, sigma or duplex blades, individual 30 HP motors, drives, power screw tilts; 2 — Baker-Perkins 100 gal., sigma or dispersion blades, jacketed, hydraulic tilts; 3 — Baker-Perkins 50 gal., sigma blades, jacketed; 2 — Day 35 gal. sigma blade. Prices are lower than ever before — Phone or wire collect for details. PERRY EQUIPMENT CORP., 1409 N. 6th St., Philadelphia 22, Pa.

FOR SALE

1—22" x 60" Adamson mill, 150 HP.
1—18" x 50" Thropp mill, 60 HP.
1—10" x 18" 2-roll mill, 25 HP.
1—6" x 12" 3-roll Adamson calender.

CHEMICAL & PROCESS MACHINERY CORP.
52 9th Street
Brooklyn 15, N. Y. Phone HY 9-7200

ARMACO

We are one of the foremost specialists in supplying everything in used, reconditioned and new machinery for the Rubber and Plastics industries only.
NEW—Laboratory mills, hydraulic presses, extruders, bale cutters and vulcanizers. We are interested in purchasing your surplus machinery or complete plant.

AKRON RUBBER MACHINERY CO., INC.
200 South Forge St., Akron 9, Ohio, Phone HEmlock 4-9141

Several 22 x 22 x 60" mills complete with motor and drive
1—#00 Laboratory Banbury mixer
1—#1 Banbury mixer—jacketed
1—#3A Banbury mixer—jacketed
1—#9 Banbury mixer—spray type
#1, #2, #3 and #4 Royle rubber extruders
11 — 24 x 24" presses, 18" ram, 18" stroke, 40" daylight
New 6 x 13" Laboratory mills and calenders

Large quantity of large ram presses up to 42 x 42" bed area.
All machines offered are fully rebuilt and guaranteed.
Buying and Selling.

Reliable
RUBBER & PLASTIC MACHINERY CO., INC.
2014 UNION TURNPIKE NORTH BERGEN, N. J.
PHONE: UNION 5-1073

ATTENTION

Just purchased the entire assets of large New England rubber plant. We can offer on location under power:

#3 Banbury Mixer with 75 HP vari-drive.
#3 Royle Extruder with 30 HP motor drive.
Two #2 Royle Extruders with 15 HP motor drive.
One #4 six inch Extruder
Two forty inch Birmingham top cap mills with 100 HP motor drive.
One forty inch Birmingham mill with 100 HP motor drive.
Many other pieces of miscellaneous equipment available.

COME SEE — COME SAVE!

JOHNSON MACHINERY CO.
683-R Frelinghuysen Ave.
Newark, New Jersey
Bigelow 8-2500

What do you need? What have you to sell?

HEAVY RUBBER & PLASTIC MACHINERY

Rebuilt Bearing . . . part of N.E.E. Service

- Rebuilt
- Installed
- Repaired

Complete job done right in your plant. No supervision required. 30 years experience in servicing mills, mixers, calenders, tubers, etc.

Metal spraying jobs welcomed. Used equipment bought and sold.

WRITE — WIRE — PHONE TODAY

New England Engineering Co., Inc.
P.O. Box 465, Derby, Conn. REgent 5-6441

NEW CONCEPT

in calender and mill frame construction — frames of fabricated steel weldments — lifetime guarantee — new machines built in any size

Guaranteed
NEW · USED · REBUILT MACHINERY
21 SHERMAN ST. • WORCESTER, MASS.

DIVISION OF BOTWINIK BROTHERS OF MASS., INC.
SHERMAN RUBBER MACHINERY CO.

ALBERT and MACHINERY

are synonymous to the rubber industry

The following is an excerpt from one of our Midwest customer's recent letters pertaining to our service:

'We recently had a mill breakdown due to a broken Bull Gear on our mill. This breakdown occurred at 5:00 P.M. 2/4/59. Because of the excellent cooperation of your company, we were able to locate a Bull Gear in your Trenton yard and have it shipped to our plant in Illinois in such a manner that we were able to operate our mill within 36 hours after the breakdown occurred. Since this mill is the only mill we have and we are completely dependent on the operation of this mill for the entire production line of our plant, please accept this note of gratification not only on the part of our management, but also on the part of the employees whose time loss was reduced to a minimum because of your cooperation.'

P. E. ALBERT & SON
P.O. Box 453, Trenton 3, New Jersey
Phone: EXport 4-7181

BLACK ROCK
Rubber
Band
Cutter

With one single setup you can cut infinitely variable band widths —from 1/16" to 1"— Adjustments can be made while your machine is in operation—600 to 800 cuts per minute.

COMPLETE LINE OF MACHINERY AND EQUIPMENT

WRITE TODAY

FINE BR TOOLS

BLACK ROCK MFG. CO.
179 Osborne Street • Bridgeport 5, Connecticut
NEW YORK OFFICE 261 BROADWAY

Choose MOLD LUBRICANTS with Care

for precision work • for quality • for clean release

We have over 25 varieties of Mold Lubricants, Silicone Oils, Emulsions, and non-Silicones, which are being used by rubber and plastic manufacturers throughout the world. One of these will surely help you out of your troubles.

All Samples Now Packed In Pressure Pak Cans For Your Convenience In Testing.

BLACK CELLULOSE FLOCK FOR SALE

For Complete Technical Data & Prices.

Write or Phone:

STONER'S INK CO.

Quarryville, Pennsylvania **STerling 6-2745**

BIRDS

that Audubon never knew 'til now

Identifying Marks: Constant cry "Who . . Who . . Who took my mag?" Can never put his hands on copy of magazine when he wants it most. Always frustrated, easy prey to the Swift Grabber.

Best Remedy: Enough additional copies of RUBBER AGE to go around. The coupon below will take care of your Who's Who—each of your key men should have his own subscription. **Mail your order now.**

RUBBER AGE,
101 West 31st St., New York 1, N. Y.

Please enter . . . . subscriptions to RUBBER AGE, starting with the next issue, for:

☐ **Three Years** ☐ **Two Years** ☐ **One Year**

We understand that each subscription costs $10 for 3 years, $7.50 for 2 years, and $5 for one year (U. S. Rates).

Send bill to: ☐ **Company** ☐ **Each Person**

Name ..... Title .....
Name ..... Title .....
Name ..... Title .....
Company .....
Street .....
City ..... Zone .... State .....

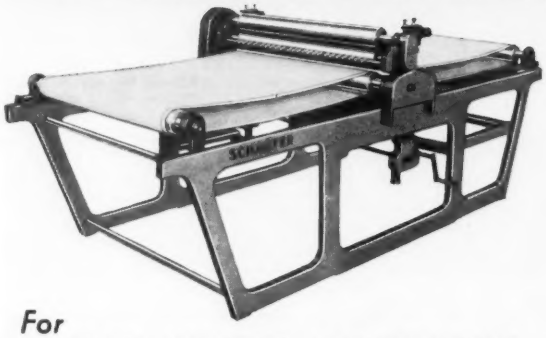
459

ALL STEEL, ALL WELDED CONSTRUCTION, with forged steel hubs for 1¼", 1½" and 2" square bars. 4", 5", 6" 8", 10", 12", 15", 20" and 24" diameters. Any length.

Also Special Trucks, Racks, Tables and Jigs, Used in manufacturing rubber and plastic products.

THE W. F. GAMMETER COMPANY
CADIZ, OHIO

Schaefer Solvent RUBBER CEMENTER
for applying plastic & rubber cement



For
FOAM CUSHIONS AND PILLOWS

Cushion halves of assorted shapes and sizes, up to 4" thick, are cemented efficiently. Coating fully to edges. No excess cement to soil the sides or ooze into the holes. Save cement. Save labor. Cement pieces transfer (coated side up) on to production assembly conveyor. Use latex or solvent rubber cement.

Schaefer
MACHINE COMPANY, INC.
135 FRONT ST. • BRIDGEPORT 6, CONN.
Tels. N. Y. City: LE 2-2010 • Boston: MI 3-8096 • Bridgeport: FO 8-2250

Rubber Age

Published monthly by THE PALMERTON PUBLISHING CO., INC.

101 West 31st St., New York 1, N. Y.

INDEX

Volume 84 — October, 1958-March, 1959

A

Absorptiometric Determination of Traces of Copper in Rubber Chemicals and Products .....*R. C. Madan* 451
Ace Elects New President 316
Advantages of Wooden Pallets for Handling Rubber Products .....*William H. Sardo, Jr.* 444
Akron Polymer Group Plans Lecture Series 119
Akron University Celebrates 50th Anniversary of the Teaching of Rubber Chemistry (Oct. 3) 108
Alcoa to Acquire Rome Cable 990
Aluminum Silicate Extender Pigments, Improved 631
AMERICAN CHEMICAL SOCIETY
Holds 134th Meeting (Sept. 7-12) 298
Names Officers for 1959 831
AMERICAN SOCIETY OF MECHANICAL ENGINEERS
Rubber and Plastics Division Holds 2-Day Meeting in New York (Dec. 3-4) 650
AMERICAN SOCIETY FOR TESTING MATERIALS
Committee D-11 Holds Spring Meeting in Pittsburgh (Feb. 4-6) 980
SAE Technical Committee Issues Reports 461
Antioxidants, Colorimetric Determination of Amine 263
Apparatus for Preparing O-Ring Tensile Specimens, An .....*S. A. Eller* 812
AUTHORS
Back, A. L. 98
Back, Aaron L. 639
Baker, E. H. 88
Bedford, J. E. 102
Bluestein, A. C. 440
Bobear, W. J. 448
Braendle, H. A. 431
Braley, Jr., S. A. 75
Brams, Stewart, L. 277
Brown, Clifford M. 91
Childers, R. W. 275
Creighton, Jr., Albert M. 286
Eller, S. A. 812
Farrar, Larston D. 456
Fiorenza, A. 945
Fletcher, W. P. 632
Fogg, S. G. 632
Gage, F. W. 277
Gillman, H. H. 275
Grossman, R. F. 440
Gruber, E. E. 959
Hamilton, J. W. 88
Harrington, Robert 798
Heller, G. L. 431
Hill, James T. 268
Hilton, C. L. 263
Keplinger, O. 939
Klesper, Ernst 84
Konkle, G. M. 975
Leonard, Fred 268
Madan, R. C. 451
McGavack, John 789
Prendergast, John J. 619
Railsback, H. E. 967
Roush, C. W. 75
Sardo, Jr., William H. 444
Savage, R. M. 972
Tufts, E. 963
Vicino, Jr., S. 795
White, J. W. 431
Wyman, C. G. 955

Page Arrangement for Volume 84

No.	Issue	From Page	To Page
1	October, 1958	1	184
2	November, 1958	185	370
3	December, 1958	371	536
4	January, 1959	537	716
5	February, 1959	717	882
6	March, 1959	883	1064

B

BACK, A. L.
Mill Roll Speed Ratios 98
BACK, AARON L.
How to Get More Information from Readings of Rotational Viscosimeters.. 639
BAKER, E. H., and HAMILTON, J. W.
Efficient Handling of Carbon Black Shipments 88
BEDFORD, J. E.
Safety Programs for the Rubber Plant 102
Behavior of Silicone Rubber .....*W. J. Bobear* 448
Bellanca Names New Board 135
BLUESTEIN, A. C., and GROSSMAN, R. F.
Ozone Resistance of Butyl Rubber 440
BOBEAR, W. J.
Behavior of Silicone Rubber 448
BOOK REVIEWS
Adhesives and Sealants in Building (Nat'l. Academy of Sciences) 149
Adipic Acid (National Aniline) 506
Alnor Pyrotac (Illinois Testing Lab.).. 691
Bechman/Spinco Preparative Ultra Centrifuge Model L (Beckman Instruments) 691
Carbon Black in Rubber (Equipment Corp.) 690
Catalin Antioxidants (Catalin Corp. of America) 1036
Chemical Process Equipment (Patterson-Kelley) 344
Choosing the Right Polyglycol (Dow).. 506
Cowles Rotary Knives and Special Tools (Cowles) 345
Diamond Precipitated Calcium Carbonates in Neoprenes (Diamond Alkali). 151
Die Praxis Des Gummichemikers (Berliner Union) 343
Directory of New England Manufacturers: 1959 (George D. Hall) 504
Effect of Moisture Content of Metallic Chloride Catalysts on the Dimethylol Phenol Cure (Thiokol) 151
BOOK REVIEWS (Cont'd)
Effects of Accelerator and Sulfur Concentrations on Ozone Resistance and Physical Properties in the Sulfur Type Cure (Thiokol) 506
Effects of Ionizing Radiation on Natural and Synthetic High Polymers (Interscience) 504
Effects of Radiation on Materials (Reinhold) 850
Elmes Hydraulic Equipment for the Plastics Industry (Elmes Engineering) 853
E-M Synchronizer (Electric Machinery) 1034
Evaluation of Non-Black Fillers for Colored Butyl Compounds: Group III —Clays (Thiokol) 852
Evaluation of Very Small Amounts of Copper and Manganese in Raw Rubbers and in Some Ingredients (Pirelli) (In Italian) 852
Fact Book for Selecting Quad Ring Seals and O-Rings (Minnesota Rubber) 344
Factors to Consider in the Selection and Application of Automatic Transfer Switches (Automatic Switch) 345
Flectol H Antioxidants for Rubber (Monsanto Ltd.) 690
Flexzone 6-H (Naugatuck) 853
Fundamentals of High Polymers (Reinhold) 148
Goodyear Rims (Goodyear) 853
Handbook of Chemistry and Physics: 40th Edition (Chemical Rubber) 689
Heat Seal Characteristics of Polyethylene Films 345
How Abrasive Belt Grinding Increases Production at Lower Cost (Engelberg Huller) 151
Huber Aerfloted Clays for the Rubber Industry (J. M. Huber) 1034
Hyde Handbook of Industrial Knives (Hyde Mfg.) 691
Igepon Surfactants (General Aniline).. 345
Information and Communication Practice in Industry (Reinhold) 148
Johnson Horizontal Steam Generator (Mears-Kane-Ofeldt) 690
Jordan Controls (Jordan Co.) 690
Latex Accelerator Study: Hevea-SBR 2105 Blends (Pennsalt) 1036
Le-Hi Hose Accessories Catalog (Hose Accessories) 1036
Link-Belt Ball Bearing Trolleys (Link-Belt) 345
Link-Belt Precision Steel Rollers Chains and Sprockets (Link-Belt) 506
Man-Made Fibres (John Wiley) 850
Monsanto Chemicals for the Footwear Industry (Monsanto Ltd.) 691
New Patapar Releasing Parchments (Paterson Parchment Paper) 853
Pelleted Accelerators for Rubber (Monsanto Ltd.) 151
Phillips 66 Hydrocarbons and Sulfur Chemicals (Phillips Petroleum) 1034
Phillips Rubber Research (Phillips Petroleum) 1036
Physical Chemistry of High Polymers (John Wiley) 502
Piccolyte Resins (Pennsylvania Industrial) 852

BOOK REVIEWS (Cont'd)
Problems and Practices in Engineering Management (AMA) 502
Process Equipment and Systems (Sprout, Waldron) 691
Properties and Testing of Plastics Materials, The (Chemical) 149
Raw Materials: A Study of American Policy (Council on Foreign Relations) 689
RC Plasticizers and Comonomers (RCA) 690
Resins for the Rubber Industry (Schenectady Varnish) 1036
Revertex Concentrated Rubber Latex (Revertex, Ltd.) 344
Rheology of Elastomers (Pergamon).. 688
Rubber (Servire) 1032
Rubber Chemicals for Cables (Imperial Chemicals) 150
Santovar A (Monsanto Ltd.) 151
Selection Guide to Silicone Insulating Components (Dow Corning) 344
Solithane 113 (Thiokol) 1034
Static Power Adjustable Speed Drives (Cutler-Hammer) 150
Story of Technology, the (DuPont) ... 853
Synthetic Rubber Facts (Firestone) ... 150
Technical Editing (Reinhold) 1032
Techniques of Plant Maintenance and Engineering (Clapp & Poliak) 342
Vanderbilt Rubber Handbook (R. T. Vanderbilt) 342
Vinyl-Nitrile Rubber Study (Kenrich). 344
Vinyl Resins (Reinhold) 688
Waldron Web Process Engineering (John Waldron) 852
What Is the Rubber Industry? (RMA) 150
BRAENDLE, H. A., HELLER, G. L., and WHITE, J. W.
Colloid Phase Carbon Reinforcement of Rubber 431
BRALEY, JR., S. A., and ROUSH, C. W.
Effects of Silica Fillers, Vulcanizing Agents and Other Additives on Compression Set of Silicone Rubber 75
BRAMS, STEWART L., and GAGE, F. W.
High Temperature Resistance of Polymer-to-Metal Bonds 277
Brazil, Goodrich to Build Tire Plant in 322
British Products Group Formed 486
BROWN, CLIFFORD M.
Deterioration of Neoprene-Coated Nylon Fabrics 91
BUTADIENE-STYRENE RUBBER
New English Plant on Stream 818
Plant Opens in West Germany 301
Plioflex 1713 and 1714C (Goodyear) .. 991
BUTYL RUBBER
Enjay Announces Butyl Package 834
Ozone Resistance of .....
..*R. F. Grossman and A. C. Bluestein* 440

C

CANADA
Goodrich Denies Charge on Refusal to Deal with Red China 1012
Kelly-Springfield to Begin Operations in 670
Polymer Announces 1959 Capital Budget of $6.6 Million 1012
RTA Opposes Tariff Proposals 836
Yohe Elected President of Goodrich-Canada 130
CARBON BLACK
Colloid Phase Carbon Reinforcement of Rubber .....*H. A. Braendle, G. L. Heller and J. W. White* 431
Continental Carbon Plans Expansion.. 475
Efficient Handling of Shipments .....
....*E. H. Baker and J. W. Hamilton* 88
New Method of Identifying Carbon Blacks .....*A. Fiorenza* 945
United Carbon Begins Construction of Technical Service Laboratory 831
CHEMICALS AND COMPOUNDING INGREDIENTS
Accelerator DMT (Wallace A. Erickson) 477
Alamask RLT Series (Rhodia) 660
Antioxidants (Eastman) 471
Antioxidants, Sulfur-Containing Thermal (Bell Telephone Laboratories) .. 469
Antiozonant-Antioxidant (Goodyear) .. 480
Color Concentrates (Eastman) 470
Compounds 17007 and 17107 (Precision Rubber) 461
Cyan Blue XR-55-3770 (American Cyanamid) 475
Fomrez R-400 and P-20 (Witco Chemical) 320
Indene (Neville Chemical) 307
Indopol H-1900 (Amoco) 472
Kyrax A Mold Release Agent (Air Reduction) 478
LE-46 Mold Release Agent (Union Carbide) 128
Mark LL Vinyl Stabilizer (Argus Chemical) 302
MCC-100 Latex Formulation 833
Niax Catalyst D-22 (Union Carbide).. 475
Odor Retentive Compounds (Tyrex Drug & Chemical) 319
CHEMICALS (Cont'd)
Paralese Mold Release (Para Products) 318
Poly-Dispersions (Wyrough & Loser).. 313
Polyco XP-24-97 (Borden Chemical) .. 314
Polyfils (Huber) 822
QCD-5010 and 5020 PVC (Bakelite).. 309
Santicizer 409 (Monsanto) 467
Solfast Blue G 43100 (Sherwin-Williams) 473
Stabilizer 6-V-2 (Harshaw) 651
Strontium Chromate 12170 Pigment (Sherwin-Williams) 990
Vibrin 136A (Naugatuck Chemical) .. 307
Vult-Accel E Dispersion (General-Latex) 112
CHILDERS, R. W., and GILLMAN, R. W.
Temporary Bonding of Nylon to Rubber 275
cis-Polybutadiene Elastomers, New Developments in .....*H. E. Railsback* 967
Colloid Phase Carbon Reinforcement of Rubber .....*H. A. Braendle, G. L. Heller and J. W. White* 431
Colorimetric Determination of Amine Antioxidants .....*C. L. Hilton* 263
Coloring Wire Jackets, A Paint Applicator for 795
Copolymer Opens New Research Center 821
Copper, Absorptiometric Determination of Traces of in Rubber Chemicals and Products 451
CREIGHTON, JR., ALBERT M.
Low-Cost Molds for Rubber 286

D

Deterioration of Neoprene-Coated Nylon Fabrics .....*Clifford M. Brown* 91
Determining Discoloration of Rubberlike Films by Reflectance Spectrometry... ....*James T. Hill and Fred Leonard* 268

E

EDITORIALS
Cold War Export Policies 813
European Common Market and Rubber 978
Rubber Industry Technical Meetings .. 289
"Safe Tires Save Lives" 101
Statistics: Fact or Fancy? 647
Year-End Review 455
Effects of Silica Fllers, Vulcanizing Agents and Other Additives on Compression Set of Silicone Rubber.....
..*C. W. Roush and S. A. Braley, Jr.* 75
Efficient Handling of Carbon Black Shipments *E. H. Baker and J. W. Hamilton* 88
Elastomer Research and Development Conference Held by Armed Forces (Oct. 15-17) 293
ELLER, S. A.
An Apparatus for Preparing O-Ring Tensile Specimens 812
England, SBR Plant on Stream 818

F

Fabrics for Coating Subject of QMC Conference (Oct. 16-17) 465
FARRAR, LARSTON D.
How Good an Executive Are You? ... 456
FIORENZA, A.
A New Method of Identifying Carbon Blacks 945
FIRESTONE TIRE & RUBBER CO.
Adds New Tire Size for Foreign Cars 817
Building Diene and Coral Rubber Plant 987
Development:
Diene Synthetic Rubber 316
GAO Cites Profits on Defense Contracts 486
Offers Tire-Rim License 317
Revises Tire Names 112
FLETCHER, W. P., and FOGG, S. G.
Natural Rubber Compounds for High Temperature Service 632
Fluoroelastomers, New Developments in .....*E. Tufts* 963
FOGG, S. G., and FLETCHER, W. P.
Natural Rubber Compounds for High Temperature Service 632

G

GAGE, F. W., and BRAMS, STEWART L.
High Temperature Resistance of Polymer-to-Metal Bonds 277
Gasolines vs. Elastomers .....
.....*John J. Prendergast* 619
GENERAL TIRE & RUBBER CO.
Development:
Safety Winter Cleat Tire 472
Three Executive Appointments Announced 112
Germany, Combine Opens Synthetic Rubber Plant 301
GILLMAN, H. H., and CHILDERS, R. W.
Temporary Bonding of Nylon to Rubber 275
B. F. GOODRICH RUBBER CO.
Developments:
Boat Trailer Tires 319
Canning Belt 332
Industrial Products' Fire Hose 843
Industrial's Extralite Shoe Soling 676
Maxecon Heel 1016
Keener Succeeds Collyer 107
GOODS AND SPECIALTIES
Air-Conditioned Boot (Tingley) 490
Aluminum Siding (Hastings Aluminum) 680
Aviation Refueling Hose (Quaker Rubber) 141
Belt Conveyor, Hammock-Style (Hewitt-Robins) 139
Butyl Rubber Roof Coating (Montgomery Ward) 138
Canning Belt (Goodrich) 332
Chamie-Tex (Milwaukee Dustless) ... 1020
Extralite Shoe Soling (Goodrich Industrial) 676
Flexible Plastic Barge (Reichhold) ... 495
Flexsteel Sanitary Hose (Goodyear) .. 678
Foamedge Vibration Dampeners (Sterling Alderfer) 140
Fortex Gar-Boy Container (Cauchotex) 678
G. S. Bottle Carrier (General Scientific) 1016
"Hi Vue" Clear Plastic Ball (Barr Rubber) 840
Horseshoe Set (Barr Rubber) 139
Hunting Parka, Camouflaged (Hodgman) 139
Industrial Fire Hose (Goodrich Industrial) 843
Industrial Glove (U. S. Army Quartermaster) 138
Kar License Kover (Rubbermaid) 141
Kitchen Products (Rubbermaid) 840
Lawn Mower Grass Catchers (Jacobsen Mfg.) 140
Life Raft (Goodyear) 680
Maxecon Heel (Goodyear) 1016
Multipurpose Hose (Burton Mfg.) ... 334
Naugahyde Upholstery Material (U. S. Rubber) 334
Nimble Fingers V-20 Acid Resistant Glove (Pioneer Rubber) 842
One-Piece Urethane Arm Rests (Davidson) 1022
Pace Upholstery Fabric (U. S. Rubber) 490
Para-Vinl Shoe Soling (Gro-Cord) 330
Pile Driver Hose (Republic Rubber) .. 141
Portable Sky Camp (Sky Camp) 328
Puncture Sealing Powder (U. S. Rubber) 325
Releasing Parchment No. 40-91T (Paterson Parchment) 994
Repair Kit (Automotive Rubber) 496
Safety Suit (Skope Mfg.) 1022
Shower Stall Mat (Rubbermaid) 320
Spiral Shaped Rubber Idler (Hewitt-Robins) 842
Sponge Rubber Rug Underlay (U. S. Rubber) 676
Supreme All-Vinyl Flooring (Goodyear) 842
Synthetic Letterpress Rollers (Dayton Rubber) 328
Synthetic Rubber Industrial Tire (Goodyear) 843
Teflon Coated Conveyor Belt (Quaker). 495
Traffic Cones (Industrial Products) .. 332
Trail-O-Balloons (Barr) 334
Truck Unloading Fuel Hose (Hewitt-Robins) 140
Ventura Kar-Rug (Rubbermaid) 1020
Vinyl Football (Barr) 320
White Kleen Sweep Matting (Ace) ... 496
GOODYEAR TIRE AND RUBBER CO.
Developments:
Antiozonant-Antioxidant 480
Flexsteel Sanitary Hose 678
Life Raft 680
Nylon Custom Super Cushion Tire ... 473
Nylon Steel Guard Tire 318
Plioflex 1713 and 1714C Synthetic Rubbers 991
Stock Car Tires 479
Suburbanite Winter Tire 313
Supreme All-Vinyl Flooring 842
Synthetic Rubber Industrial Tire 843
Earnings in 1958 Hit Record High ... 1006
Realigns Executive Staff 297
Rubber Industry Pays Tribute to Litchfield 653
GROSSMAN, R. F., and BLUESTEIN, A. C.
Ozone Resistance of Butyl Rubber 440
GRUBER, E. E., and KEPLINGER, O.
New Developments in Polyurethanes .. 959

H

HAMILTON, J. W., and BAKER, E. H.
Efficient Handling of Carbon Black Shipments 88
Handling Pelletized Rubber 283

HARRINGTON, ROBERT
How Hot Water Affects Elastomers .. 798
HELLER, G. L., WHITE, J. W., and BRAENDLE, H. A.
Colloid Phase Carbon Reinforcement of Rubber 431
High Temperature Resistance of Polymer-to-Metal Bonds .....
...*Stewart L. Brams and F. W. Gage* 277
HILL, JAMES T., and LEONARD, FRED
Determining Discoloration of Rubberlike Films by Reflectance Spectrometry 268
HILTON, C. L.
Colorimetric Determination of Amine Antioxidants 263
How to Get More Information from Readings of Rotational Viscosimeters .....*Aaron L. Back* 639
How Hot Water Affects Elastomers ....
.....*Robert Harrington* 798

I

Improved Aluminum Silicate Extender Pigments 631
Improved Synchronization of Feed Rolls 454
Infrared Spectroscopy in the Rubber Industry 626
INSTITUTION OF THE RUBBER INDUSTRY
Drogin Elected Fellow 649
Schoenfeld to Receive Medal 462
International Rubber Conference, Tentative Program Scheduled for 656

K

KEPLINGER, O., and GRUBER, E. E.
New Developments in Polyurethanes .. 959
KLESPER, ERNST
Application of Volatile Organic Liquids for Expanding Flexible Urethane Foam 84
KONKLE, G. M.
New Developments in Special Purpose Silicone Polymers 975

L

LABOR
URW Holds Convention in Miami 114
LEGAL
Bellanca to Liquidate 307
LEONARD, FRED, and HILL, JAMES T.
Determining Discoloration of Rubberlike Films by Reflectance Spectrometry ... 268
Low-Cost Molds for Rubber .....
.....*Albert M. Creighton, Jr.* 286
Low Temperature Rubber 282

M

MACHINERY AND EQUIPMENT
Adjustable Pump (Allis-Chalmers) 145
Air-Hydraulic Trim Press (B&T Machinery) 498
Alnor Pyrotroller (Illinois Testing Labs.) 144
Automatic Spray Machine (Conforming Matrix) 844
Constant Temperature Test Cabinet (Electric Hotpak) 686
Convection Ovens (Blue M Electric) .. 1030
Crude Rubber Bale Cutter (Snow Mfg.) 340
Differential Pressure Indicator (Aircraft Porous) **1026**
Drum Burnerator (Atomic Sales) 336
Electric Strip Heaters (Edwin L. Wiegand) 682
Extruders (Davis-Standard) 844
Hard Rubber Tester (Epic, Inc.) 338
Hydraulic Bench Press (Hannifin) ... 849
Hydraulic Press (Allied Engineering).. 341
Hydraulic Press (Ajax) 336
Industrial Ovens (Kirk & Blum) 145
Knife-Saver Cutting Machine (Eastman) 146
Laboratory Roll Mill (JMC) 1030
LECO Gasometric Carbon Analyzers (Laboratory Equipment) 682
Measuray Thickness Gage (Sheffield).. 475
Multipress (Denison) 142
Multipress Homogenizers - Disperser (Willems Polytron) 144
NAEF Punch Press (SMS Instrument) 1026
Pressure-Reducing Valve (OPW-Jordan) 340
Roller Die Cutter (Falls Engineering). 338
Rotary Cutter (Hobbs) 684
Rotary Knife Cutter (Munson Mill).. 846
Short Model Inspection Table (G. F. Goodman) 499
Smaco Injection Molding-Splicing Machine (Sivon Mfg.) 1025
Taperweave Curve Conveyor (Wiretyer) 684
Time-Time Plotter (Mast Development) 498
Torsional Damping Tester (W. J. Hacker) 500

MACHINERY AND EQUIPMENT (Cont'd)
Visi-Flo Sight Glass Indicators (OPW-Jordan) 846
MADAN, R. C.
Absorptiometric Determination of Traces of Copper in Rubber Chemicals and Products 451
McGAVACK, JOHN
The Future of Natural Rubber 789
Mill Roll Speed Ratios .....*A. L. Back* 98
Molds, Low Cost for Rubber 286
Monsanto Plant on Stream 114

N

NATURAL RUBBER
Future of Natural Rubber .....
.....*John McGavack* 789
Natural Rubber Compounds for High Temperature Service .....
.....*W. P. Fletcher and S. G. Fogg* 632
Philippine Rubber Growing Expanded 480
Neoprene, Deterioration of, Coated Nylon Fabrics .....*Clifford M. Brown* 91
New Developments in Elastomers (Southern Rubber Group Symposium—Jan. 30-31)
New Developments in *cis*-Polybutadiene Elastomers .....*H. E. Railsback* 967
New Developments in Fluoroelastomers .....*E. Tufts* 963
New Developments in Polyurethanes .....*O. Keplinger and E. E. Gruber* 959
New Developments in Silicone Rubber .....*R. M. Savage* 972
New Developments in Special Purpose Silicone Polymers ....*G. M. Konkle* 975
New, Simpler and More Flexible System for Compounding Silicone Rubber, A 627
Nylon-to-Rubber, Temporary Bonding of 275

O

OBITUARIES
Allen, Charles D. 132
Bagley, Thomas J. 839
Baker, Alfred J. 672
Bruck, Paul E. L. 839
Cowen, Theodore T. 326
Crane, Clinton H. 1014
Del Guerra, Bernard 326
Dreisbach, John M. 672
Ely, Albert L. 488
Emmons, Leon 132
Eves, Archie P. 488
Farlow, Earl J. 672
Freudeman, Albert G. 1014
Gill, David F. 839
Glazebrook, James R. 132
Goldsmith, Phillip H. 132
Haag, Christian T. 488
Harrison, Clark 326
Kennedy, Joseph E. 839
King, Victor L. 488
Kite, Wilson J. 326
Liljegren, John A. 672
Lutz, Boyd E. 839
Lyon, Walter E. 132
McHan, Brack B. 488
Minich, Verne E. 839
Minnig, Carl J. 1014
Mosely, Odis O. 672
Oberto, Stefano 488
Park, James G. 1014
Pew, Paul B. 672
Pruitt, Julian S. 132
Redding, Charles S. 839
Rogers, Donald G. 1014
Shrader, Marvin O. 132
Simpson, James J. 672
Smith, Carl D. 672
Stanton, Herbert A. 132
Strauss, Howard G. 672
Sturtevant, Joseph L. 488
Thye, Adolph H. 488
Timm, Kenneth B. 839
Veazey, W. R. 1014
Walker, Hervey S. 132
Wallace, George H. 1014
Weida, Fred S. 839
Werkenthin, T. A. 326
Wiland, Carl L. 1014
O-Ring Tensile Specimens, An Apparatus for Preparing 812
Ozone Resistance of Butyl Rubber ....
..*R. F. Grossman and A. C. Bluestein* 440

P

Paint Applicator for Coloring Wire Jackets, A. .....*S. Vicino, Jr.* 795
Polymer to Metal Bonds, High Temperature Resistance of 277
POLYURETHANE
Application of Volatile Organic Liquids for Expanding Flexible Urethane Foam .....*Ernst Klesper* 84

POLYURETHANE (Cont'd)
Atlas Enters Urethane Field 462
Atlas Offers New Polyether 315
Goodrich Chemical Entering Field 991
Mobay Develops New Technique for Producing Foam Cushioning 836
New Developments in Polyurethanes...
.....*O. Keplinger and E. E. Gruber* 959
Thiokol Opens New Unit 302
Urethane Foams Gain 325
Post-Inflation .....*C. G. Wyman* 955
PRENDERGAST, JOHN J.
Gasolines vs. Elastomers 619
Puerto Rican Rubber Industry Shows Rapid Growth Pattern 308

R

RAILSBACK, H. E.
New Developments in *cis*-Polybutadiene Elastomers 967
Reclaimers Re-Elect Officers 999
Reflectance Spectrometry, Determining Discoloration of Rubberlike Films ... 268
Roads, Rubber-Asphalt Mix Method (Xylos) 486
Rolls, Feed, Improved Synchronization of 454
Rotational Viscometers, How to Get More Information From 639
ROUSH, C. W., and BRALEY, JR., S. A.
Effects of Silica Fillers, Vulcanizing Agents and Other Additives on Compression Set of Silicone Rubber 75
RUBBER DIVISION, A. C. S.
Library Changes Policy 137
Meets in Chicago (Sept. 10-12) 104
Rubber Literature List Compiled by Library Association of London 466
RUBBER GROUPS
Akron Begins Season 121
Akron Holds Fall Meeting (Oct. 24) .. 316
Akron Holds Symposium on New Elastomers (Jan. 23) 992
Akron Sponsors Rubber Compounding Lectures 828
Boston Honors Past-Chairmen (Oct. 17) 302
Buffalo Elects Officers; Holds Xmas Party (Dec. 9) 832
Chicago Hears Wendrow and Caprino (Nov. 15) 649
Chicago Hears Panel on GR-S Synthetic Rubber (Jan. 30) 1001
Chicago Holds Xmas Party (Dec. 19) 657
Connecticut Holds Annual Outing (Sept. 6) 314
Connecticut Holds Technical Meeting (Nov. 14) 469
Connecticut Holds Winter Meeting (Feb. 13) 1002
Detroit Elects Officers 835
Detroit Holds Fall Meeting (Oct. 3) .. 469
Detroit and Wayne University Conduct Rubber Courses 1012
Elastomer Group Hears Keskkula on Modified Polystyrenes (Jan. 20) 1003
Elastomer Group Hears Lerner (Oct. 21) 296
Fort Wayne Hears Beekley (Dec. 4) .. 658
Fort Wayne Hears Vodra (Sept. 25).. 113
Los Angeles Announces Spring Technology Courses 1010
Los Angeles Elects Officers 660
Los Angeles Meets (Nov. 4 and Dec. 12) 484
New York Elects Officers; Holds Radiation Symposium (Oct. 17) 305
New York Holds Xmas Party (Dec. 12) 660
Northern California Hears Estrada and Terway (Jan. 8) 991
Northern California Hears Morris (Nov. 13) 484
Northern California Holds Fall Meeting (Sept. 6) 107
Northern California Installs Officers (Dec. 6) 658
Ontario Section Holds Panel on Uses of Reclaimed Rubber (Jan. 13) 1005
Philadelphia Elects Officers, Hears Talk on Elastomers (Oct. 24) 471
Philadelphia Hears Pfeiffer (Jan. 23) 823
Philadelphia Holds Golf Outing (Aug. 22) 117
Quebec Hears MacDonald (Jan. 15) .. 1002
Quebec Offers Technology Course 118
Southern Ohio Plans Lecture Series... 118
Southern Rubber Group Holds Symposium on New Developments in Elastomers (Jan. 30-31) 959
Southern Rubber Meets in Dallas (Jan. 30-31) 988
Thiokol Honors Pioneers in Synthetic Rubber 827
Washington Hears Hayward (Feb. 2) . 822
Washington's Season Activities Announced 135
RUBBER MANUFACTURERS ASSOCIATION
Holds 43rd Annual Meeting (Nov. 20). 458
Opposes Increased Highway Tax 825
Predicts 13% Rise in 1959 U. S. Consumption 648
Rubber Salesmen's Group Hears Jansen (Oct. 24) 303

S

SAFETY
N.S.C. 46th Exposition Planned for Chicago (Oct. 20-24) 115
Programs for the Rubber Plant ..... *J. E. Bedford* 102
Safety Problem: Epoxy Resins and Amine Curing Agents 100
SARDO, WILLIAM H., JR.
Advantages of Wooden Pallets for Handling Rubber Products 444
SAVAGE, R. M.
New Developments in Silicone Rubber 972
SILICA RUBBER
Effects of Silica Fillers, Vulcanizing Agents and Other Additives on Compression Set of Silicone Rubber ..... *C. W. Roush and S. A. Braley, Jr.* 75
SILICONE RUBBER
Behavior of Silicone Rubber ..... *W. J. Bobear* 448
Compounding Silicone Rubber, A New, Simpler, and More Flexible System for 627
New Developments in Silicone Rubber ..... *R. M. Savage* 972
New Developments in Special Purpose Silicone Polymers ..... *G. M. Konkle* 975
Silastic RTV 502 (Dow Corning) 462
Society of Plastic Engineers Holds Session on Cellular Plastics (Jan. 27-30) 999
Society of the Plastics Industry Sponsors 8th National Plastics Conference-Exhibit (Nov. 17-21) 468
Spanish Rubber Industry Study Team Visits U. S. Under ICA Sponsorship 824
SPECIAL INDUSTRY REPORTS
Employee Grievances, How to Handle.. 979
Executive Compensation in the Rubber Industry, A Further Look ..... *John Macomber* 290
SPECIAL INDUSTRY REPORTS (Cont'd)
How Good an Executive Are You? ..... *Larston D. Farrar* 456
Safety Programs for the Rubber Plant 102
Some Pointers on SBA Loans 814
Synthetic Rubber—See Butadiene-Styrene, Butyl, Nitrile, etc.

T

Temple University Offers Rubber Technology Course 114
Temporary Bonding of Nylon to Rubber ..... *H. H. Gillman and R. W. Childers* 275
Testing Aircraft Refueling Hose 447
Time Study and Wage Incentives in Rubber Industry, Seminar on, Held in Chicago (Sept. 23-25) 303
TIRES
Boat Trailer Tires (Goodrich) 319
Commuter Truck and Bus (Seiberling) 831
Growth in Replacement Tire Sales 297
Low Profile Tire (U. S. Rubber) 116
Nylon Custom Super Cushion (Goodyear) 473
Nylon Steel Guard (Goodyear) 318
Safety Winter Cleat (General Tire) .. 472
Stock Car (Goodyear) 479
Suburbanite Winter Tire (Goodyear) .. 313
Synthetic Rubber Industrial (Goodyear) 843
Two-Piece Tire Tube Valves 99
TUFTS, E.
New Developments in Fluoroelastomers 963

U

Union Carbide Buys Plant 660
UNITED STATES RUBBER CO.
Cuban Tire Unit on Stream 114
U. S. RUBBER CO. (Cont'd)
Developments:
AirWall Applications Expanded 112
Low Profile Tire 116
Naugahyde Upholstery Material 334
Pace Upholstery Fabric 490
Puncture Sealing Powder 325
Sponge Rubber Rug Underlay 676
Vibrin 136A 307
Humphreys Cites Growth in Replacement Tire Sales 297
Profits in 1958 Off 24% 1006
Stock Ownership Broadened 316
Textile Division Expands 318

V

VICINO, JR., S.
A Paint Applicator for Coloring Wire Jackets 795
Volatile Organic Liquids, Application of, for Expanding Flexible Urethane Foam ..... *Ernst Klesper* 84

W

Wage Incentives and the Rubber Industry 823
WHITE, J. W., HELLER, G. L., and BRAENDLE, H. A.
Colloid Phase Carbon Reinforcement of Rubber 431
Wire and Cable Symposium Held (Dec. 2-4) 652
Wooden Pallets for Handling Rubber Products, Advantages of ..... *William H. Sardo, Jr.* 444
WYMAN, C. G.
Post-Inflation 955

ONE
Last Chance to get in the 1959 RUBBER RED BOOK

See page 26

Advertisers in this Issue

Adhesives Age 54
Aetna-Standard Engineering Co. 38
Akron Rubber Machinery Co. 173
Albert, P. E. & Son 173
Allied Chemical Corp. 138
American Cyanamid Co.
Pigments Div. 27
Rubber Chemicals Dept. ..... Insert 149
American Hard Rubber Co. 172
Ames, B. C., Co. 140

Barco Manufacturing Co. 147
Bastread Products Co. 172
Black Rock Mfg. Co. 174
Bolling, Stewart, & Co., Inc. 16
Borg-Warner Corp., Marbon Chemical Div. ... 17
Brown Co. 133

Cabot, Godfrey L., Inc. 73
Cadillac Associates, Inc. 171
Cambridge Instrument Co. 141
Carter Bell Manufacturing Co. 135
Celanese Corp. of America 47
Chemical & Process Machinery Corp. 173
CLASSIFIED ADVERTISING 170-74
Cleveland Liner & Manufacturing Co. 74
Columbia-Southern Chemical Corp. ..... Insert 56-57
Columbian Carbon Co. ..... 28; Insert 109-10
Commercial Solvents Corp. 9
CONSULTANTS SECTION 172
Continental Carbon Co. ..... Insert 127
Copolymer Rubber & Chemical Corp. ..... Insert 137
Cowles Tool Co. 125
Cumberland Engineering Co., Inc. 32

D. P. R. Inc. 141
Darlington Chemicals, Inc. 147
Davis-Standard Div., Franklin Research Corp. ... 150
Day, J. H., Co. 145
Diamond Alkali Co. 10
Dow Corning Corp. 48-49
Drake Personnel, Inc. 170
du Pont de Nemours, E. I. & Co., Inc.
Elastomer Chemicals Dept. ..... Second Cover
Pigments Dept. 35
Durez Plastics Div., Hooker Chemical Corp. 58

Eagle-Picher Co. 145
Eastman Chemical Products, Inc. 60
Eastman Machine Co. 140
Endura Corp. 163
English Mica 171
Enjay Co., Inc. 128
Erie Engine & Mfg. Co. 159
Farrel-Birmingham Co., Inc. 59
Firestone Synthetic Rubber & Latex Co. 33
Franklin Research Corp., Davis-Standard Div. ... 150
French Oil Mill Machinery Co. 161

Gammeter, W. F., Co. 174
General Electric Co. ..... Insert 24-25
General Porcelain Manufacturing Co. 30
General Tire & Rubber Co., Chemical Div. 70
Genseke Brothers 69
Gidley, Philip Tucker 172
Goodman, G. F., & Son 143
Goodrich, B. F., Chemical Co. 3
Goodrich-Gulf Chemicals, Inc.
Carbon Black 53
Goodyear Tire & Rubber Co.
Chemical Div. ..... Insert 11-14

Hale & Kullgren, Inc. 38; 172
Hall, C. P., Co. 155
Harwick Standard Chemical Co. ..... Fourth Cover
Hoggson & Pettis Manufacturing Co. 169
Hooker Chemical Corp. 58
Holmes, Stanley H., Co. 34
Howe Machinery Co., Inc. 171
Huber, J. M., Corp. 7

Independent Die & Supply Co. 30

Jefferson Chemical Co., Inc. 129
Johnson Machinery Co. 173

K. B. C. Industries, Inc. 172
Kaumagraph Co. 134

Litzler, C. A. Co., Inc. 8

Marbon Chemical Div., Borg-Warner Corp. 17
Martin Rubber Co., Inc. 172
Muehlstein, H., & Co., Inc. 29

National Aniline Div., Allied Chemical Corp. ... 138
National Polychemicals, Inc. 31
National Rosin Oil Products, Inc. 171
National Rubber Machinery Co. 65
National Standard Co. 36-37
Naugatuck Chemical Division,
U. S. Rubber Co. 40-41, 76
Nelson Employment Service 171
Neville Chemical Co. 75
New England Engineering Co., Inc. 173
New Jersey Zinc Co. 15

Olin, R. R., Laboratories 172
Ozone Research & Equipment Corp. 161

Pasadena Hydraulics, Inc. 142
Pelmore Laboratories, Inc. 172
Pennsalt Chemicals Corp. 43
Petro-Tex Chemical Corp. 23
Phillips Chemical Co.
Philblack 4
Philprene 63

Reliable Rubber & Plastic Machinery Co. 173
Rhodia, Inc. 139
Richardson, Sid, Carbon Co. 180
Ross, J. O., Engineering Div.,
Midland-Ross Corp. 42
Royce Chemical Co. 21
Royle, John, & Sons 163
Rubber Age Circulation 174
Rubber Corp. of America 163
Rubber Journal 165
Rubber Red Book 26

Sargent's, C. G., Sons Corp. 22
Schaefer Machine Co., Inc. 174
Schulman, A., Inc. ..... Third Cover
Scott Testers, Inc. 143
Scovill Manufacturing Co. 46
Shaw, Francis & Co., Ltd. 157
Shell Chemical Corp., Synthetic Rubber
Sales Div. 50
Sherman Rubber Machinery Co. Div. 173
Skelly Oil Co. 64
Snell, Foster D., Inc. 153
South Florida Test Service 172
Spadone Machine Co. 136
Stamford Rubber Supply Co. 159
Stanford Engineering Co. 165
Stoner's Ink Co. 174

Tamms Industries Co. 142
Texas-U. S. Chemical Co. ..... Insert 44-45
Titanium Pigment Corp. 39

United Carbon Co., Inc. ..... Insert 67-68
U. S. Rubber Co., Naugatuck
Chemical Div. 40-41; 76
U. S. Rubber Reclaiming Co., Inc. 132
Universal Oil Products Co. 18-19
Utility Manufacturing Co. 146

Vanderbilt, R. T., Co. ..... Front Cover

Wellington Sears Co. 151
Witco Chemical Co. ..... Insert 127
Wood, R. D., Co. 55

HUGHES PRINTING CO.
EAST STROUDSBURG, PA.

...little things mean a lot

The little *extras* offered by ***TEXAS CHANNEL BLACKS*** make them a little better than all the rest. These extras in ***TEXAS "E"*** and ***TEXAS "M"*** add up to more value and profit for you:

1. Unsurpassed Quality
2. One-Plant Uniformity
3. Distinctive Grades
4. Continuous Supply
5. Protective Inventories
6. Stabilized Price
7. Gas-Black Research

Ask us for details!

TEXAS
CHANNEL BLACKS
®

Sid Richardson
CARBON CO.

FORT WORTH, TEXAS

GENERAL SALES OFFICES
EVANS BUILDING
AKRON 8, OHIO

Plastics
and
Rubber
The Schulman insignia is your guarantee of quality, service and uniformity to meet exact requirements. Schulman's up-to-date methods and modern equipment under an exacting system of quality controls insures that all your shipments of plastics and rubber will perfectly match.
QUALITY CONTROL
S
Call
A. Schulman Inc.
for Fast Service on...
SYNTHETIC RUBBER, SCRAP RUBBER
CRUDE RUBBER, HARD RUBBER DUST
POLYETHYLENE, POLYSTYRENE
and VINYL

AKRON 9, OHIO
790 E. Tallmadge Ave.
HEmlock 4-4124

NEW YORK 22, NEW YORK
460 Park Avenue
MUrray Hill 8-4774

BOSTON 16, MASS.
738 Statler Building
LIberty 2-2717

CHICAGO 45, ILL.
2947-51 W. Touhy Ave.
Rogers Park 1-5615

EAST ST. LOUIS, ILL.
14th and Converse Sts.
BRidge 1-5326

LOS ANGELES 17, CAL.
Texaco Building
3350 Wilshire Boulevard
DUnkirk 5-3018

HANOVER, GERMANY
Bodekerstrasse No. 22
Telephone: 2-6212

LONDON E.C. 3, ENGLAND
Ibex House, Minories
Telephone: Royal 4989

PARIS 2e, FRANCE
Rubber & Plastics, S.A.
13, Rue Marivaux
Telephone: Richelieu 78-93

BRUSSELS, BELGIUM
Rubber & Plastics, S.A.
Galerie Louise 43 B
Tel: Brussels 11-02-76

Our 30th Year

A. Schulman Inc.

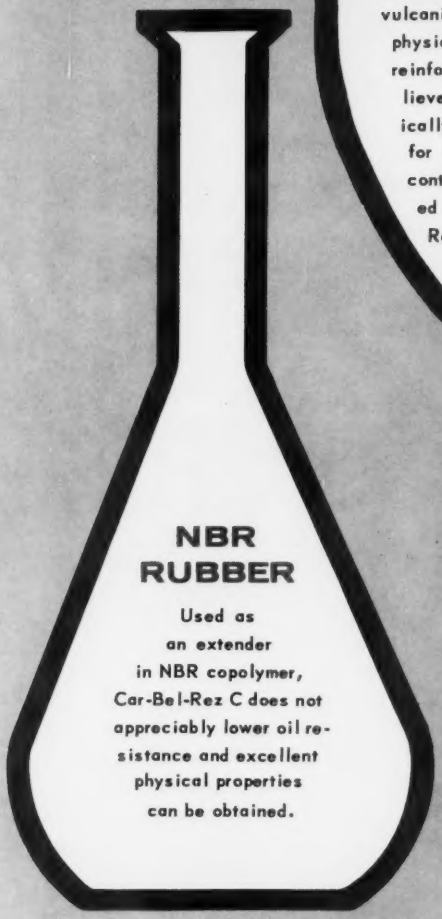
CUTS COST WITHOUT CUTTING QUALITY

CAR-BEL-REZ C T. M.

IN SBR, NEOPRENE AND NBR RUBBER

SBR

When compounded in equal parts with SBR, Car-Bel-Rez C yields vulcanizates of improved oil and ozone resistance with excellent physical properties and processing. The resin is an excellent reinforcing agent in non-black stocks. Car-Bel-Rez C is believed to be co-vulcanized with the SBR through the chemically combined sulphur in the resin, which is also responsible for its oil resistance. The "free sulphur" (polysulphide) content materially reduces the sulphur or accelerators needed in the recipe. SBR vulcanizates containing Car-Bel-Rez C can be made to meet the basic requirements for oil-resistant rubber, type S, Class SC.



NBR RUBBER

Used as an extender in NBR copolymer, Car-Bel-Rez C does not appreciably lower oil resistance and excellent physical properties can be obtained.

NEOPRENE

When up to 20 parts of Car-Bel-Rez C are added to neoprene stocks, they maintain neoprene's oil resistance without materially changing physical properties. However, the resin reduces stickiness, improves bin aging, plasticizes the stock and gives good flex life. When 50 parts are added, superior ozone resistance is obtained.

CAR-BEL-REZ C disperses easily without high-temperature mixing.

• Don't miss the Rubber Division Meeting in Los Angeles, May 13, 14, 15th.

CAR-BEL-REZ C IS MADE BY THE CARTER BELL MFG. CO.
FOR COMPLETE TECHNICAL AND APPLICATION DATA WRITE TO:

HARWICK STANDARD CHEMICAL CO.

60 SOUTH SEIBERLING STREET AKRON 5, OHIO

ALBERTVILLE, ALA. OLD GUNTERSVILLE HWY • BOSTON 16, MASS. 661 BOYLSTON ST • CHICAGO 25, ILLINOIS 2724 W. LAWRENCE AVE • GREENVILLE, S.C. P.O. BOX 746 • LOS ANGELES 21, CALIF. 1248 WHOLESALE STREET • TRENTON 9, N.J. 2595 E. STATE ST

43rd YEAR

Rubber Age

COVERING THE MANUFACTURE OF RUBBER AND RUBBERLIKE PLASTICS PRODUCTS

MAY, 1959

In This Issue

...w gamma radiation ...fects compression ... of rubbers page 243

...bber vs. plastics ... footwear and ...or tile page 259

Leather Impregnants ...portance of ...stomer components page 267

Special Report Problems of the plant supervisor page 270

...ntents ....page 187

New for Vinyls VANSTAY® RR

Improved Liquid Barium-Cadmium Heat and Light Stabilizer worthy of your immediate consideration in calendering and extrusion recipes where plate out is a problem and good low cost protection is required.

We recommend 3 parts on the resin content for optimum performance in process and in service.

®Registered U.S. Trademark

R. T. Vanderbilt Co., INC. 230 Park Avenue New York 17, N. Y.